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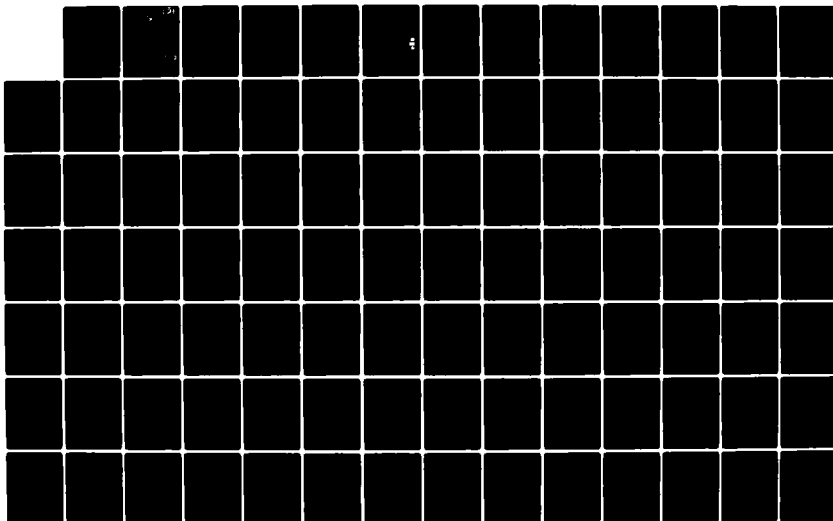
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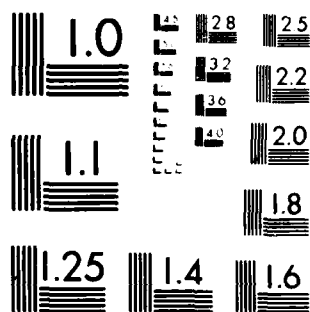
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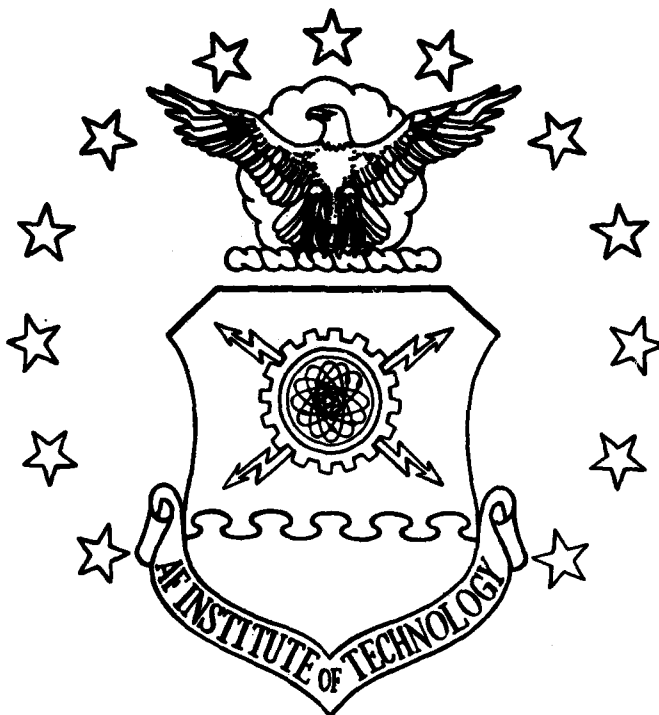
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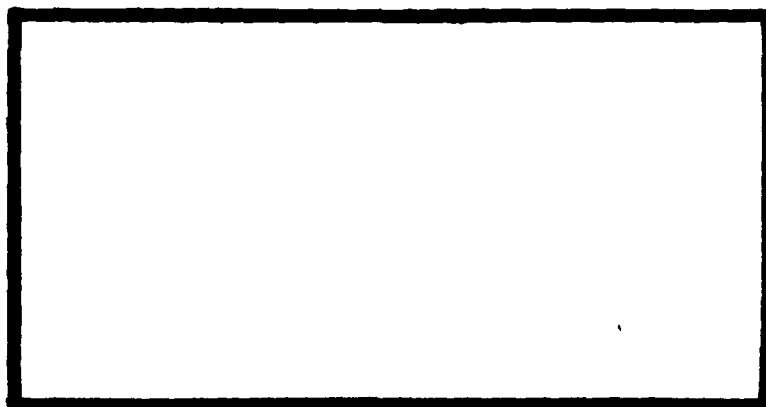


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THE UTILITY OF HANDHELD PROGRAM-  
MABLE CALCULATORS IN AIRCRAFT  
LIFE CYCLE COST ESTIMATION

Captain Dennis P. Brooks, USAF

LSSR 41-82

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Life cycle cost estimation is a high priority issue in systems acquisition and maintenance. Interest begins with the Office of the President. Over the last twenty-three years this interest has generated a plethora of reports and models to estimate life cycle costs. The complexity and magnitude of this information has caused many to avoid life cycle cost analysis. This report explores the utility of handheld programmable calculators in estimating aircraft life cycle costs. Selected current computer models were analyzed by function and cost generation technique. Two were identified and simplified for use with a Hewlett-Packard HP-41CV calculator. Five other programs, currently in a format for the Texas Instruments TI-59 calculator, were converted and expanded as necessary for general usage with the HP-41CV. The report contains the research; programs generated; example program runs; a comparison between the HP-41CV output, the original format output, and where applicable actual costs; and suggestions for further research. The results indicate that programmable calculators can be a valuable tool in life cycle cost estimation.

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THE UTILITY OF HANDHELD PROGRAMMABLE  
CALCULATORS IN AIRCRAFT LIFE CYCLE  
COST ESTIMATION

A Thesis

Presented to the Faculty of the School of Systems and Logistics  
*of the Air Force Institute of Technology*

Air University

In Partial Fulfillment of the Requirements for the  
Degree of Master of Science in Logistics Management

By

Dennis P. Brooks, BS  
Captain, USAF

September 1982

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This thesis, written by

Captain Dennis P. Brooks

has been accepted by the undersigned on behalf of the faculty of the  
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ments for the degree of

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COMMITTEE CHAIRMAN

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## CHAPTER I

### OVERVIEW

Managing costs in acquisition programs has assumed prime importance in today's budget environment. A realization that total program costs at times overshadow differences in acquisition costs has led to viewing programs in terms of life cycle cost (LCC). The complexity and sheer quantity of data required to manage a program through its life cycle has led to the use of computers. Yet, even the use of computers is hampered by complex computer programs requiring large amounts of input data, computer terminal accessibility, and computer time availability. Program managers are required to make their decisions based on readily available information, the quality of which makes a significant contribution to overall life cycle management efficiency and effectiveness.

The introduction of the handheld programmable calculator has had a significant impact on reducing the cost and time of the feedback loop in making life cycle cost assessments of design and in developing life cycle cost impacts. Their use has been made possible by the development of cost estimating relationships (CERs). These CERs are sets of variable inputs in fixed mathematical relationships. An example would be:  $\text{Design Cost} = 2.07 (\text{Maximum Gross Weight})^{1.09}$ .



The "Maximum Gross Weight" is a variable input with the fixed values of 2.07 and 1.09 determined by regression of historical data that influenced design cost in the past.

Proponents of using life cycle cost analysis begin with the Executive Office of the President.

Major system management objectives. Each agency acquiring major systems should: . . . Maintain a capability to: . . . Estimate life cycle costs during system design concept evaluation and selection, full-scale development, facility conversion, and production, to ensure appropriate trade-offs among investment costs, ownership costs, schedules, and performance [9:3-5].

Unfortunately, to date, there exists no comprehensive method of determining total life cycle costs. A multitude of models exist, each determining some portion of LCC, yet none are able to encompass all variables and costs. This is due partially to the changing environment and partially to a lack of accurate historical data. There are several evaluations of current models. Three that evaluate model utility are: "Analysis of Available Life Cycle Cost Models and Their Applications," AFSC/AFLC Commander's Working Group 1976; "Selected Models Used in Life Cycle Cost Analyses," AFIT/LSCT 1977; and "An Appraisal of Models Used in Life Cycle Cost Estimation for USAF Aircraft Systems," RAND 1978.

Despite the existence of current models, Air Force policies and procedures have not been fully standardized and have failed to provide a reliable method for accurately forecasting life cycle costs.

As a result, LCC models and forecasts are often misused, inaccurate, and/or inconsistent. The purpose of this study is to examine several current LCC models used to estimate aircraft costs and to develop a limited, easily used model for use with a programmable calculator. The models examined are in use by Department of Defense (DOD) agencies and the civilian aircraft industry. Due to the speed and memory limitations of hand-held programmable calculators, only models using CERs to estimate life cycle costs will be used or evaluated.

The next chapter will review, first, the life cycle cost concept, providing a background, vocabulary, and general knowledge of the theory of LCC. Second, the problem will be further defined. Third, justification will be presented to verify the existence of the problem. Finally, there will be a statement of the research objective and the research hypothesis with the research questions pertinent to the problem.

## CHAPTER II

### BACKGROUND

Life cycle cost is defined by the Office of Management and Budget (OMB) as:

. . . the sum total of the direct, indirect, recurring, non-recurring, and other related costs incurred, or estimated to be incurred, in the design, development, production, operation, maintenance, and support of a major system over its anticipated useful life span [9:3].

The Office of the Secretary of Defense, Cost Analysis Improvement Group (OSD CAIG), separates life cycle cost into four areas: research and development; procurement; operating and support; and disposal (10:2).

The phrase, life cycle cost, first appeared in the early nineteen sixties when the problem was identified that operations and support costs of weapon systems at times far exceeded the initial acquisition costs (5:1). It was considered essential to incorporate "the total cost to the Government of acquisition and ownership of that system over its full life [10:2]," in decisions that led to acquisition, replacement, or major modification. Concern for cost control to meet requirements with shrinking budgets led to the current DOD life cycle cost program.

"Life Cycle Costing in the 80's," (5:1-7) gives an excellent

recount of the history of LCC in the DOD. The following is a synopsis of that article. Table 1 portrays the development of LCC. The Logistics Management Institute, a nonprofit research organization working for the DOD, coined the phrase "life cycle cost" in studying contract awards. Their study found that consideration of costs from initiation of requirement to retirement of the system could have significant effects on contract award. Based on this, several trial LCC procurements were initiated. The better known of these is the purchase of aircraft tires. Several companies presented tires to meet an Air Force requirement. Based solely on price, company A would have received the contract. However, the various tires were tested to determine wear and failure rates. The "useful life" was to a point of maximum acceptable wear or failure. The results of the study led to the selection of company B's product. A higher priced tire with a significantly longer useful life yielded the best cost/landing ratio. This study graphically portrayed the value of evaluating life cycle cost versus initial price in acquisition decisions. In 1964 DOD Directive 4100.35, calling for design of integrated logistics support to minimize system LCC, was part of a new emphasis to reduce support costs. At this same time, several systems considered life cycle costs during the advanced development and contract definition phase. In the late sixties defense spending was not popular with the public. This was due in part to the unpopular Vietnam War and

**TABLE 1**  
**The History of Life Cycle Cost Development**

1960-65	LMI Studies
1963-65	Trial LCC Procurements
1964	DOD Directive 4100.35 on ILS
1964-68	Trial System Level Life Cycle Costing
1967-72	Special Studies on Cost Growth
	Defense Science Board
	Blue Ribbon Committee
	Little Four Studies
	Congressional Commission
1969	DOD Instruction on Economic Analysis
1970	DOD Guide LCC-1 on Life Cycle Cost for Equipment; DOD Guide LCC-2 Casebook on Equipment Level LCC; Design to Cost Proposed
1971	DOD Directive 500.1 on Acquisition of Systems; AFLCM/ AFSCM 800-4 on ORLA
1972	DTC Test Cases on 17 systems/10 subsystems; Commis- sion on Government Procurement; MIT Study on consumer life cycle cost
1973	DOD Guide LCC-3 on Life Cycle Costing for Systems;

TABLE 1--Continued

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	DOD Directive 5000.4 on OSD CAIG, Dept. Sec. Defense Clements Implementation Memorandum; Joint Logistics Commander's Guide on Design to Costs; GSA Federal Supply Services LCC Program Implemented
1974	Budget Act on 1974; Public Law 93-400; MIL STD 1390A on Level of Repair
1975	DOD Directive 5000.2 on the Major System Acq. Process; DOD Directive 5000.28 on Design to Cost; DOD VAMOS Cost Study; GSA Federal Supply Services LCC Studies
1976	DOD Directive 4105.62 on Source Selection; OMB Circu- lar A-109 on Systems Acquisition; Design to Life Cycle Cost Test Case (F-18)
1977	Bill S. 1264 (Chiles Bill) Initiated
1977-79	DOD Directive Updating; 5000.1, 5000.2, 5000.3, 5000.4, JCC DTC Guide, 4100.35
1978	Senate asks for Life Cycle on SAR Systems; Chiles Bill resubmitted; South Carolina State Purchasing Agents Seminar on LCC
1979	Chiles Bill resubmitted

---

partly because of an increasing movement toward the support of social programs in lieu of military spending. The shrinking funds and increasingly expensive weapon system costs led to several studies seeking alternatives to lower system replacement costs. A common recommendation of all the studies was initiation of LCC analysis in evaluations of system costs.

In 1970, the DOD issued the first guidance on how to apply LCC analysis: LCC-1, on equipment level (versus system level) acquisitions; and LCC-2, devoted to case studies in equipment level life cycle costs. 1971 brought three major steps in LCC development. DOD Directive 5000.1 firmly established the requirement for life cycle cost and design to cost. Air Force Logistics Command Manual (AFLCM)/Air Force Systems Command Manual (AFSCM) 800.4, Optimum Repair Level Analysis (ORLA), determined LCC in repairs at depot, intermediate, or base level. The third step was the evaluation of line replaceable units (LRUs) and shop replaceable units (SRUs) by LCC in the Logistics Support Cost (LSC) model. In 1973, the DOD issued LCC-3 giving LCC guidance for systems acquisition. This was followed with the establishment of the CAIG (DOD Directive 5000.4), and the Joint Logistics Commander's issuance of "Life Cycle Cost as a Design Parameter," integrating design to cost and life cycle costing. DOD Directive 5000.28, issued in 1975, required a modified form of LCC in design-to-unit-production-cost goals. The Visibility and

Management of Support Cost (VAMOSOC) study was implemented to improve estimation of downrange cost capability. In 1976, DOD Directive 4105.62 required consideration of LCC in source selection. The F-18 contract was a trial LCC procurement with a life cycle cost incentive clause in the contract. OMB Circular A-109 came out requiring the use of LCC in the acquisition process by all executive branch agencies. Senator Chiles, Subcommittee on Federal Spending Practices and Open Government, introduced and has continued to re-submit a bill requiring LCC considerations in all federal procurements. The Senate Committee on Armed Services, in 1978, asked for LCC estimates on selected acquisition review (SAR) programs. The DOD guidance on life cycle costing is continually updated. Keeping pace with the development of the life cycle costing field are models to portray LCC. The use of LCC models continues to expand as the models are more fully developed and proven useful.

The rationale for using LCC is that decisions made early in the acquisition phase have a potential for far-reaching effects in total system costs. Decisions involving system design, performance, and operational characteristics significantly affect operation and support costs. These and other factors can be controlled by managers in the acquisition phase if the managers have appropriate information for making decisions.



## The Problem

The current LCC problem is twofold. First, models must be identified and derived that adequately portray the cost elements driving total cost in each phase of a system life cycle. Second, managers require a usable form of the models that is readily accessible.

The effective application of life cycle costing (LCC) generally requires the use of a life cycle cost model. Historically, this has caused problems because many who should be involved in life cycle costing have felt they could not adequately comprehend the LCC models involved [8:1].

. . . life cycle analysis is not yet a finished and fully effective management tool. The conceptual framework for life cycle analysis has developed in patchwork fashion and is still incomplete. Policy guidance for its use and purpose needs to be more fully explicated. Important questions remain about the preferred organizational and procedural arrangements for preparing, corroborating, documenting, reviewing, and acting upon life cycle analysis studies. The methodology of life cycle analysis is also incomplete. And while a wide array of life cycle cost (LCC) models are in common use, data to support them and conventions to guide their application are lacking [3:1].

The CAIG has identified simplicity as an important and desirable trait in the use of LCC models: "Often the cost, labor hours, and schedule required to set up and provide data for a complex model prohibits its effective and timely use in the decision process [10:5]." There is a continuing requirement to provide better information in LCC analyses on a timely basis to managers. ". . . maximum leverage for the control of life cycle (costs) lies in the use of

simpler models. This fact seems to be well recognized in both industry and government. The trend is in this direction [14:24]." Several LCC models have been reduced for use on the Texas Instruments TI-59 handheld programmable calculator. Table 2 provides a list of the calculator programs reviewed and their usage. Unfortunately, these programs develop results for isolated portions of total life cycle cost. Managers in the acquisition process need an analytical tool at their fingertips to evaluate LCC implications of daily decisions on a system as well as component level. At the present time, a consistent, reliable, accurate, and readily available method of estimating system life cycle cost has not been identified.

#### Research Objective

The objective of this research is to identify those cost elements in current LCC models that have historically driven aircraft LCC in each area of the life cycle. These elements will be used to identify a model for use in a handheld programmable calculator to provide acquisition managers with a reliable and useful LCC analysis at a level that will enhance time and effort expended on decisions. The model will be tested for utility by comparison with current full scale computer model results, actual system costs, and expert opinion.

TABLE 2

Calculator Life Cycle Cost Programs Reviewed

- 
1. Aircraft Top-Level Life Cycle Cost Models, Nov 1977. (Northrop)
  2. Cost Oriented Resource Estimating (CORE) Model, Jun 1981.
  3. Economic Analysis Model, Sep 1979.
  4. External Tank Spares (Replacement Spares) Model, Mar 1978.
  5. Learning Curve Programs, Aug 1978.
  6. Life Cycle Cost Model, Apr 1981 Revision.
  7. Logistics Support Cost Model for Ground Support Equipment,  
Mar 1978.
  8. Next Generation Trainer (NGT) Operating and Support Cost  
Model, Sep 1980 Revision.
  9. Optimal Repair Level Analysis for Ground Support Project, Mar  
1978.
  10. Raw Inflation Programs, Jun 1979 Revision.
  11. Weighted Inflation Programs, Jan 1980 Revision.
-

### Research Hypothesis

A model can be developed, within the limitations of a handheld programmable calculator, that will provide useful information in aircraft acquisition decisions. The alternate hypothesis is considered to be that the limitations of the handheld calculator or the methodology used in converting the programs for calculator use precluded the development of useful information within defined limits.

### Research Questions

1. What are the cost drivers in the models available for each phase of the acquisition process and system life cycle?
2. What combination of cost elements will yield an effective model for aircraft LCC analysis on a handheld programmable calculator?
3. What models are currently used at the Aerospace Systems Division for aircraft LCC analysis?
4. What additional models are in use in civilian industry that could contribute to aircraft LCC analyses?
5. What are the results in evaluation of current models?
6. How well does a calculator model predict future costs when compared to original computer programs and actual costs?

## CHAPTER III

### SCOPE AND DELIMITATION

To maintain the usefulness of the model the equations and requirements for data will be limited to the capabilities of a Hewlett-Packard HP-41CV calculator with extended function and memory modules. The HP-41CV was chosen because of its alpha-numeric capability (the calculator has a full twenty-six letter keyboard with limited punctuation) and because of the state-of-the-art versatility in programming. Several peripherals are available for extended memory, hardcopy printout, video interface, and special application software. Any calculator of comparable memory could be used.

Calculation of a completely accurate life cycle cost requires a large amount of sometimes inaccessible data and a perfect knowledge of the future. The scope of life cycle cost estimations is vividly portrayed in the complexity of current programs dealing with limited areas of total life cycle costs. The major use of life cycle cost models is to compare the relative costs of alternatives. Representative costs can be derived from limited data with the use of CERs. Several trends have been identified by Dr. H. I. Starr (PhD) of Logistics Technology International, Ltd., in determining key cost drivers in aircraft LCC (15:1-5):

	<u>% of LCC</u>
Research and Development	3-10%
Production	20-30%
Operating and Support	60-77%

#### 1. R&D Cost Drivers

- a) item/assembly/system weight tends to be proportional to cost.
- b) power in electronics systems and engines tend to be proportional to cost.
- c) risk, quantified by advanced materials, power to weight, etc., has a significant influence on cost.
- d) even though a small percentage contribution, decisions made during R&D in design tradeoffs have a significant effect on later phases.

#### 2. Production Cost Drivers

- a) chosen tolerance range and item reliability
- b) number of electronics subsystems
- c) production quantity
- d) advanced materials
- e) number of suppliers

#### 3. Operating and Support Cost Drivers

- a) use rate
- b) deployed quantity
- c) mission scenario
- d) failure/maintenance rates

#### 4. Indirect Cost Drivers

- a) funding
- b) schedules
- c) current acquisition process

Current models were reviewed with these cost drivers in mind. The models tended to support Doctor Starr's identification of cost drivers.

This study is designed to bring enough causal factors into a limited model to produce a useful tool. There are several programs available for use with a TI-59 calculator that have proven the usefulness of such limited programs. This study draws upon existing models to produce an increasingly complex derivation of life cycle cost. The complexity is governed by the amount of data available to the user. Peripheral sub-programs provide information on learning curves, reliability, line replaceable unit (LRU) and shop replaceable unit (SRU) design trade-offs, and LRU/SRU optimal repair level analysis.

Due to time constraints and calculator limitations, the analysis is limited to those models in Table 2 and Table 3. The limitations of the HP-41CV will identify the depth and scope of the model. The calculator as used had a 2333 byte memory enhanced to a 6554 byte memory with three extended memory modules.

TABLE 3  
Selected Computer Life Cycle Cost Models

- 
- 
1. Air Force Logistics Command Operations and Support Cost Model
  2. Cost Oriented Resource Estimating (CORE) Model
  3. Cost Reduction Is Everyone's Responsibility (CRIER) Life Cycle  
Cost Model
  4. Designing to System Performance/Cost (DSPC)
  5. Development and Production Costs of Aircraft III (DAPCA III)
  6. Engine/Airframe Generalized Life Cycle Cost Evaluator (EAGLE)
  7. Expected Values Model
  8. Life Cycle Cost Model for Aircraft Engines
  9. Life Cycle Cost Model for Inertial Navigation Systems (INS LCC)
  10. Logistics Composite Model
  11. Logistics Support Cost Model (LSC)
  12. Modular Life Cycle Cost Model (MLCCM)
  13. Multi-Echelon Technique for Recoverable Item Control (METRIC/  
MOD-METRIC)
  14. Optimum Repair Level Analysis (ORLA)
  15. Planning Programming and:
    - Budgeting Annual Cost Estimating (BACE)
    - Cost Analysis Cost Estimating (CACE)
    - Missile Annual Cost Estimating (MACE)



TABLE 3--Continued

- 
- 
- |     |   |
|-----|---|
| 16. | Programmed Review of Information for Costing and Evaluation<br>(PRICE)  |
| 17. | Research into the Economics of Design and User Cost Effects<br>(REDUCE) |
| 18. | Simplified Maintenance Cost Model                                       |
| 19. | Weapon System Support Costs   |
-

## Research Design

### Data Source

The LCC models analyzed were collected from the Air Force Institute of Technology (AFIT), Wright-Patterson Air Force Base, Ohio, Aeronautical Systems Division/Life Cycle Cost Management Division (ASD/ACCL), Air Force Wright Aeronautical Labs/Vehicle Synthesis Branch (AFWAL/FIMB), and the civilian firms listed in Appendix B. These models have been developed and modified over the last twenty-two years. The models and equations chosen are identified and supported in Chapter 4. Data to evaluate the calculator model performance was obtained from AFWAL/FIMB and system program offices at Wright-Patterson Air Force Base. The data reflects acquisitions over the last twenty years.

### Variables

The variables of concern are those cost elements identified as cost drivers in each area of the life cycle. The models are separated into phases of the life cycle. Where limitations of the HP-41CV or the models prevent accurate computation, variable inputs will be defined by input requirements and suggested LCC models to derive aggregate data.

## CHAPTER IV

### BASIC DESIGN

The model presented in this chapter is a three-step progressively expanding input model for determining portions of aircraft life cycle costs. The model begins with four required variable inputs, progresses to twenty three, and ends with a version requiring one hundred forty five different variable inputs. A description of the input and output labels is found in Appendix A. The required units of measure are also explained in Appendix A. There are four subprograms added for user convenience to determine the effects of learning rates on production; component and/or system reliability; LRU/SRU optimum levels of repair; and LRU/SRU logistics support costs. Appendix B contains a listing of the programs in HP-41CV format. They can be converted for use with any suitable calculator. An example run of each subprogram is displayed in Appendix C.

#### Justification

The first step of the model is an airframe life cycle cost estimate based on 1981 RAND CERs (6:1-3). The RAND CERs were chosen for simplicity in use, yet are applicable to a broad range of aircraft. This step generates research and development and

production estimates of airframe cost. It can generate data on any fighter, attack, or cargo aircraft (not derived from a previous version ex: An F-5 is derived from a T-38). The lack of inputs and generality of use lead to inaccuracy, but this step does give guidance early in the acquisition cycle in estimating airframe costs. Statistical support has been generated by RAND and is listed in their documentation. Using four input variables the equations develop eight outputs. The outputs are based on one hundred aircraft and 1977 dollars. To convert to current dollars multiply the outputs in hours by the appropriate current hourly rate. Dollar outputs can be converted by application of an inflation factor. One source of inflation factors is Air Force Regulation 173-13. This step has the advantages of simplicity and early use, but the disadvantage of considering only airframe cost and there is no subsystem breakdown.

The second step of the model is a translation of a Northrop Aircraft-Top-Level Life Cycle Cost Model into the HP-41CV format. The Northrop program was chosen because it is still relatively simple, with twenty-three inputs, but it encompasses avionics and engine data as well as airframe and considers research, development, production, and operations and support costs. The model existed in a programmable calculator format. Minor mathematical errors were corrected in the translation. The model is limited to fighter/attack aircraft. As can be seen by the required inputs in Appendix A, the

model is useable early in the acquisition process. The model was designed to look for large cost differences among various alternatives during the early conceptual design phase of the acquisition cycle. The model is considered consistent with Air Force Regulation 173-10. Statistical support for the model can be obtained from the Northrop Aircraft Group. Using twenty-three inputs the model generates eighteen cost outputs. An example run is contained in Appendix B. The model is based on seven hundred and fifty aircraft and 1977 dollars. One of the inputs yields cost data on any quantity chosen. The dollar outputs can be converted to the desired year by application of the appropriate inflation factor. This step is usable early, is fairly simple, and encompasses total aircraft life cycle costs, but subsystem breakdowns are still not available.

The third and final step of the model is a limited handheld version of the Grumman Modular Life Cycle Cost Model (MLCCM), January 1980 revision. This step illustrates the expanded capabilities of handheld calculators. Although the output in the example run in Appendix C is limited it can be expanded to include any portion of the output generated by the original computer model. The example output illustrates the various formats: airframe, avionics, and engine; subsystem breakdown, avionics, and engine; and maintenance level breakdown. The program listed in Appendix B takes approximately fifteen minutes to run R&D and production costs and an additional

forty minutes to run initial spares and operations and support costs. The second portion length is due to the repetitive summation of individual costs in each subsystem. The number of inputs, memory required, and available outputs graphically illustrate the capabilities of handheld programmable calculators. This step entails one hundred and forty five different inputs and was the most comprehensive CER format computer program found. The example run displays thirty-eight outputs in R&D, production, initial spares, and operations and support costs encompassing total system life cycle costs. Quantities and inflation factors are inputted yielding output in desired year dollars and quantities. The original CERs were expressed in terms of 100 airframes, 150 avionics units, and 1000 engines. The dollar outputs are converted from 1975 dollars. According to Mr. Nathan L. Sternberger, MLCCM Air Force Point of Contact, the model is more sensitive to airframe data, but it does provide engine and avionics information for total life cycle cost estimates. Justification, support, and development of the CERs can be found in the four volume library covering the computer model. The calculator version is limited in user interaction but can be tailored to individual and program needs. Any handheld calculator with suitable memory and card reader ability can be used with an appropriate translation of the calculator model.

The engine data can be significantly enhanced by developing

engine estimations with the "Engine/Airframe Generalized Life Cycle Cost Evaluator (EAGLE)" developed by Pratt and Whitney. The program is currently being introduced as a replacement to the engine modules of the MLCCM program.

The Avionics Lab at Wright-Patterson Air Force Base, is currently developing a similar model for avionics to be introduced into the MLCCM.

Both computer models and future updates can be incorporated into the calculator model as direct inputs into the appropriate storage registers or as additions to/additional calculator programs.

The MLCCM has the advantage of subsystem breakdown to explore alternatives at a lower level. It cannot be used as early as the other models due to input requirements, but it can still be used relatively early in the acquisition cycle.

To complement the base model, Hewlett-Packard versions of ORLA, LSC, LCC Reliability, and the unit curve and cumulative average learning curve programs are provided.

The complete package is programmed and recorded on magnetic cards. Copies can be obtained through the author.

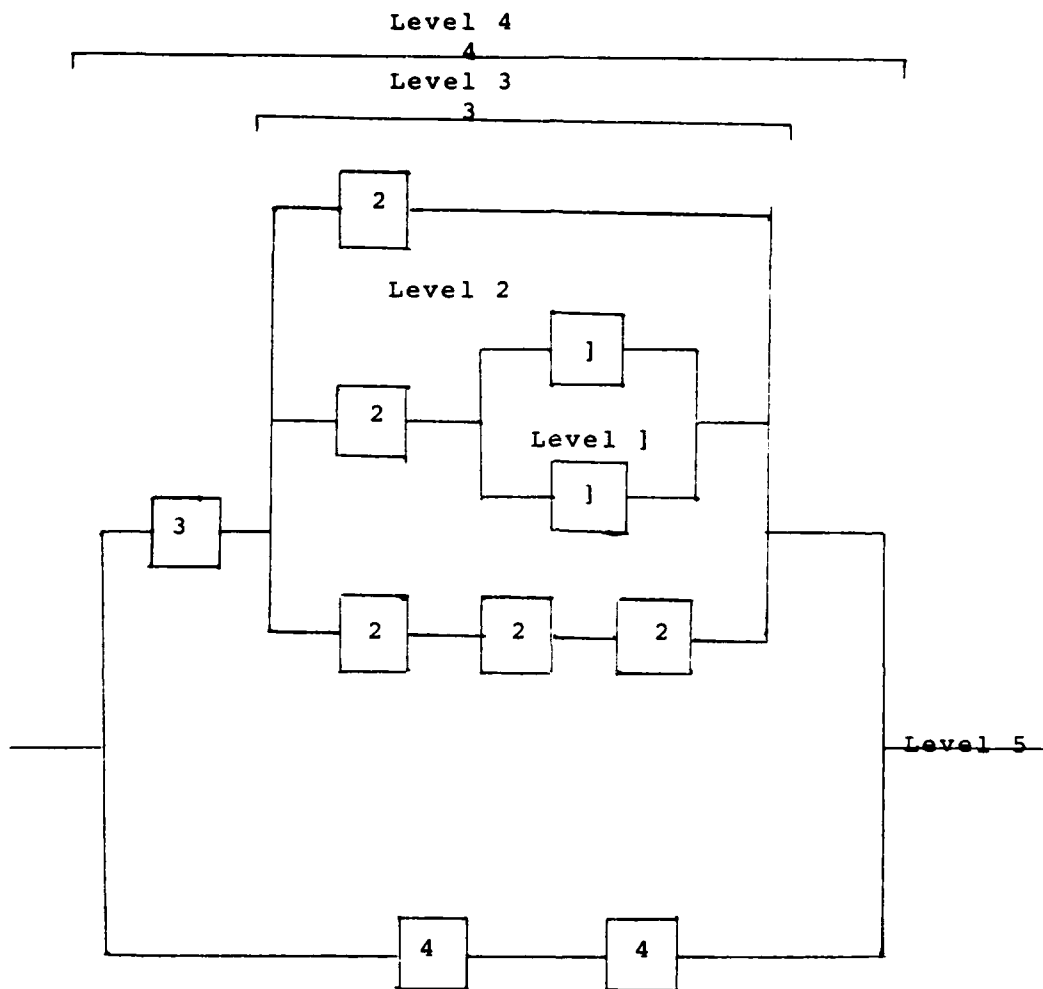
The Learning Curve (LN CURV) program is designed to determine specified unit or total production costs given first unit cost and learning rate. The program will calculate the output based on unit curve or cumulative average curve equations.

The Optimum Repair Level Analysis (ORLA) program is an expanded version of the W. E. Rogers AFLCM/AFSCM 800-4 ORLA for GSS Project for general usage. The program is designed for use at an LRU/SRU level to evaluate hardware design tradeoffs. The program determines the cost of discarding, repairing at base level, or repairing at depot level. The model does not consider common or unique AGE or facilities costs.

The Life Cycle Component Reliability program computes system reliability by evaluating reliability at each sequential level starting at any level in the system. A level is defined as a set of components with equal functional importance. An example is to start at the resistor level. Inputs consist of resistor reliability and placement in parallel or series. As each set of resistors is placed in another series or parallel arrangement a new level is reached. Sets become circuits, then circuit boards, components, black boxes, subsystems, and ultimately an aircraft, computer, or system.

The Logistics Support Cost model is useful in examining design tradeoffs, support costs, and support alternatives at a line replaceable/shop replaceable unit level. The model does not consider: training equipment, documentation, facilities, war readiness material, initial hardware installation, support equipment maintenance, modification costs, or energy requirements. The model assumes:





All components have an MTBF of 500 for  $T = 1$ .

Fig. 1. LCC Reliability Example Circuit

1. A uniform level of program activity.
2. The spares stock level and pipeline quantities are computed to support peak activity levels.
3. There is one depot and a specified number of base repair locations.
4. Each base has the same number of systems (7:1-2).

## CHAPTER V

### CONCLUSION

There is utility in transferring computer programs, or portions thereof, into programs for programmable calculators. Appendix D contains the percentage accuracy of the models used and the variations to actual costs incurred. The utility of the subprograms has and is being shown through their use in the DOD and industry.

This report has identified a number of Life Cycle Cost models in use in the DOD and civilian industry. It has also identified several recognized evaluations of model use and utility. The important cost drivers in each phase were identified and models chosen that utilized predominately those drivers. The programs/models were further evaluated for utility in conversion to use with programmable calculators. Several models were identified that existed in a programmable calculator form and were converted for use with the HP-41CV. The results of the models were compared to current computer model results and actual costs. The programmable calculator is a feasible tool and shows an expanded capacity and utility beyond its current use.

The recommendations from this study are twofold. First, continue to develop calculator LCC models using regression based

CER computer models with updates as current aircraft are acquired. Second, continue to encourage the use and development of calculator programs throughout DOD in all fields. The user orientation, availability, and cost savings are daily proving the utility of programmable calculators.

Research should be continued to increase the usability of the models herein. The programs should be updated with current information and evaluated and modified for user utility. The increasing capacity of handheld calculators with increasing technology greatly enhances their utility now and in the future.

## APPENDICES

APPENDIX A  
ACRONYM DEFINITIONS

### RAND INPUTS

EM/UN WGT?	Empty or Unit Weight?
EMP WGT?	Empty Weight?
CARGO?	Cargo Type Aircraft?
MAX SPD KNOTS?	Maximum Speed in Knots
NUM FLT TEST?	Number of Flight Test Aircraft
UNIT WGT?	Unit Weight?

### RAND OUTPUTS

100 Aircraft    1977 Dollars

HRS EN =	Hours Engineering
HRS TO =	Hours Tooling
HRS LA =	Hours Labor
\$ MATL =	Materials Cost
\$ DEV =	Development Cost
\$ PROG =	Program Cost
\$ FL T =	Flight Test Cost
QC =	Quality Control Costs

### NORTHROP INPUTS

DTJ	Dry Turbojet
ABTJ	After Burner Turbojet
ABTF	After Burner Turbofan
AW-A/A-A/G	All Weather, Air to Air, Air to Ground
AW-SF	All Weather, Single Function

VFR-SF	Visual Flying Rules, Single Function
NF	New Fighter
SS	Single Seat
AF LR	Air Frame Learning Rate in Decimal Form
EW	Empty Weight
%G	Percent Graphite (Decimal)
%T	Percent Titanium (Decimal)
%O	Percent Other Advanced Materials (Decimal)
EN LR	Engine Learning Rate (Decimal)
FMIL	Military (30 Minute) Thrust
BPR	By Pass Ratio
F MAX	Maximum (5 Minute) Thrust
N	Number of engines per aircraft
AV LR	Avionics Learning Rate (Decimal)
AV WT	Avionics Weight Uninstalled
UF	Utilization Factor (Decimal)
NYRS	Useful Life of System (Years)
UR	Utilization Rate (Hours/Year)
\$/GAL	Fuel Cost (Dollars/Gallon)
F*S	Specific Fuel Consumption per Engine at Military (30 Minute) Thrust
L/D	Maximum Lift/Drag Ratio
Q	Number of Aircraft



NORTHROP OUTPUTS

1977 Dollars

AF 750	Airframe Cost at Unit 750
PU 1000	Engine Cost at Unit 1000
P 750	Engine Cost per Aircraft at Unit 750
E 750	Avionics Cost at Unit 750
F 750	Total Cost at Unit 750
R&D	Research and Development Cost
POL\$/FH	POL Cost per Flying Hour
AQ	Airframe Cost (Q Units)
PQ	Engine Cost (Q Units)
EQ	Avionics Cost (Q Units)
FQ	Total Cost (Q Units)
I O&S	Initial Support Cost
FH O&S	Operation and Support Cost per Flying Hour
CL IV M	Class IV Modification Cost
UE O&S	Support Equipment Cost
POL O&S	POL Operation and Support Cost
OTH O&S	Other Operation and Support Cost
TLCC	Total Life Cycle Cost

## GRUMMAN INPUTS

### 1. Advanced Material      AM

W - Wing  
F - Fuselage  
N - Nacelle  
T - Tail

Ti%, S%, G%, GR%, B%

Percentage by weight of subscripted materials (1) titanium,  
(2) steel, (3) fiberglass, (4) graphite epoxy, (5) boron epoxy.

### 2. Data      DA

AL      Aircraft Length      Feet

AT      Aircraft Type      fighter/attack = 1;  
cargo/transport/tanker = 2.

AVIW      Avionics Installation      Lbs  
Weight

Weight of brackets, shelves, wiring & plugs used to  
install avionics equipment. Does not include black box  
equipment.

AVW      Avionics Weight      Lbs

Weight of avionics black box equipment uninstalled. Does  
not include wiring, shelves, cooling ducts, and fasteners.

ATBO      Average Time Between      Hours  
Overhaul

Number of flight hours accumulated by the average engine  
from one overhaul to next overhaul. Average number for  
a new development engine = 250 hours. Average number  
for an off-the-shelf engine = 1000 hours.

B/H      BTU per Hour      BTU/Hr/1000

Total cooling capacity of air conditioning equipment used  
for personnel and equipment cooling.

CW	Cargo Weight	Lbs
	Maximum internal cargo weight that a cargo/transport/tanker aircraft is capable of transporting.	
CFA	Cargo Floor Area	Square Feet
	Total area of compartment floors on which passengers/troops, wheeled vehicles and cargo are transported. Excludes baggage type compartments.	
CV	Cargo Volume	Cubic Feet
	Total volume of all compartments in which cargo is normally carried.	
EPR	Engine Pressure Ratio	Ratio
	Ratio of compressor outlet total pressure to engine inlet total pressure, at sea level static standard highest power rating uninstalled.	
FFY	First Flight Year (FFYR in years since 1900)	
FD	Fuselage Density	Lbs/Cubic Feet
	To compute, add weight of the fuselage basic and secondary structure, auxiliary power plant, instruments and navigational equipment, electrical, electronics, armament including guns and ammunition, crew furnishings and equipment, air conditioning, photographic, auxiliary gear groups, fuel system and useful load including crew but excluding fuel and stores. Also include weight of fuselage mounted landing gear and ballast. Weight of the engine section and propulsion group including air inlet shall be included for those aircraft with engines internal to the fuselage. One half of the surface controls and hydraulic/pneumatic group weight shall also be included. The remaining half is considered to be external to the fuselage. Total weight of the above is divided by fuselage volume. For those aircraft with engines installed in the fuselage, delete volume of the engine inlet duct from fuselage volume.	

FV	Fuselage Volume	Cubic Feet
	Fuselage total volume less calculated engine inlet duct volume i.e., for engine installed in fuselage.	
FL VA	Fuel Valves	Number
	Number of main line shut-off valves in main and auxiliary fuel systems for feed, distribution, refueling/defueling and jettison. Excludes APU fuel feed, vent valves and fuel shut-off valves.	
H/M	Hours per Mission	Hours
	Average mission duration for either fighter/attack or cargo/transport/tanker aircraft.	
IFLW	Internal Fuel Weight	Lbs
	Weight of total internal usable fuel for the aircraft. Includes fuel in wing, tail and fuselage.	
LW	Landing Weight	Lbs
	Maximum basic mission weight with which an aircraft must be capable of landing.	
L+S	Length + Span	Feet
	Aircraft length plus wing span.	
MM	Maximum Mach Number at Optimum Altitude	Ratio
	Aircraft speed in terms of maximum mach number at optimum altitude in clean configuration.	
MQT	Military/Model Qualification Test	Years
	Date of approval of engine qualification test expressed as years since 1900.	

#ACT	Number of Flight Control Actuators	Number
	Total number of hydraulic or electro mechanical actuators required to operate all aircraft movable flight surfaces. Example: ailerons, flaps, rudders, speed brakes, elevators, and spoilers.	
#APU	Number of Auxiliary Power Units	Number
#C/A	Number of Crew per Aircraft	Number
#CLS	Number of Control Surfaces	Number
	Total number of primary and secondary flight control surfaces, i.e., ailerons, rudders, elevators, tabs, flaps, flight and ground spoilers and slats.	
#EN	Number of Engines	Number
#EX	Number of Emergency Exits	Number
#G+S	Total number of fixed internal guns and external hard point attachment stations. Attachment stations that carry multiple weapon racks are counted as one (1).	
#HS	Total number of aircraft sub-systems which require the use of hydraulic or pneumatic power in their normal and/or auxiliary operating mode.	
#IT	Number of separate fuel cells, bladders and integral tanks which contain the internal fuel.	
#S	Number of Seats per Aircraft	Number
	This includes all crew seats plus seats or bunks for alternate crew members. Does not include passenger seats or litters.	

#W	Number of primary landing gear wheels normally used during taxi, take-off and landing.	
ULF	Structural ultimate load factor that an aircraft at Flight Design Gross Weight can withstand.	
#P	Planned or actual number of prototype and flight test aircraft.	
RMFG	Labor rate for manufacturing, including overhead. This category includes machinists, assemblers/riveters, installation mechanics, laboratory technicians, sheet metal fabrications, mechanical/fluid system technicians and finishing and processing personnel.      \$/Hr	
SS	Sink Speed	Feet/Sec
	The maximum vertical landing velocity the aircraft can withstand.	
TFF	Date of first flight of aircraft design expressed as months since 1 January 1950.	
TGWC	Take-Off Gross Weight-Clean	Lbs
	Basic mission take-off gross weight with full internal fuel, internal guns and ammunition, racks and pylons, but no external stores.	
TGWM	Take-Off Gross Weight-Maximum	Lbs
	Maximum basic mission take-off gross weight including stores.	
#PSN	Total of flight crew, relief crew, attendants and passengers/troops.	
TAVSS	Total number of avionic AN nomenclature subsystems per aircraft. If two identical subsystems are used, count as two.	

TT	Total Thrust per Aircraft, including Afterburner	Lbs
	Sum of the maximum thrust rating of uninstalled engines at sea level static standard conditions.	
TKA	Total KVA Maximum Design	KVA
	Total normal electrical power output capability of engine, air turbine motors and auxiliary power unit driven generators/alternators.	
TWA	Total Wetted Area per Aircraft	Square Feet
	Total external surface area of the aircraft including the canopy. This can be calculated by viewing the total area of the external skin as being minus curves and laid flat.	
UR	Utilization Rate	Hours/Year
	Average flight hours per active aircraft per year obtained by multiplying the average flight hours per active aircraft per month by 12 months.	
WN	Horizontal distance from wing tip to wing tip. Exclude wing tip missile installations.	
#A	Total Number of Aircraft	
FH/A	Flight Hours per Aircraft	Hours/Month
LC	Life Cycle	Months
INF	A factor to account for inflation rate from 1975 to the output year desired.	
WA	Wing Area	Square Feet
	The gross planform area of the wings from aircraft centerline to wing tips.	

WT/C	Wing Thickness to Chord Ratio, Average	Ratio
	Average of theoretical root chord and tip chord thickness divided by average of the theoretical root chord and tip chord length.	
KFD	KFOLD	WING TYPE
	1.000	Fixed
	1.728	Fold
	1.377	Variable Sweep
FWA	Fuselage Wetted Area	Square Feet
	External area of fuselage including the canopy.	
TA	Sum of the gross theoretical vertical tail area and gross theoretical horizontal tail area. For aircraft with engines breaking through carry-thru structure of horizontal tail, use exposed horizontal tail area.	
#T	Number of Tail Surfaces	Number
	Each vertical tail is counted as (1), the left hand stabilizer counts as (1), as does the right hand stabilizer.	
NWA	Nacelle Wetted Area	Square Feet
	Total wetted area of all wing nacelles on the aircraft.	
TPS	Type of Seat	Factor
	Fixed crew seats are designated (1), while ejection or high "G" seats are designated (2).	
SF	<u>SWPFAC</u>	<u>WING TYPE</u>
	0	Fixed
	0	Fold
	1	Variable Sweep
MT	<u>Total Thrust</u> Number of Engines	



TPEN	Type of Engine	Factor
	Jet propelled aircraft are designated (1), propeller driven aircraft (2).	
CSD	Constant speed drive integral to engine = 1, remotely located = 2.	
ANFT	Percentage of aluminum and steel lines using flared or flareless type AN/MS fittings.	
FTR	Yes/No	Fighter Aircraft
ATK	Yes/No	Attack Aircraft
C/T	Yes/No	Cargo/Tanker/Transport
SUBIF	Subsystem Inflation Factor	
RMIF	Raw Material Inflation Factor	
PDR	Planned highest rate of aircraft production per month to be attained during the production phase of the program.	
REGR	Labor rate for design engineering, including overhead. This category includes product engineering, vehicle technology, systems technology, engineering development test operations, engineering operations, production engineering, engineering management, and materials and processes.	
RFLT	Labor rate for flight test, including overhead. This category includes flight test planning, instrumentation, conducting of tests, flight test reporting and data acquisition.	
REN	Labor rate for engineering support, including overhead. This category includes support equipment engineering, trainer engineering, field service, publications and customer training.	
RMGT	Labor rate for program management, including overhead. This category includes program management, subcontract management, configuration/information and program control and budgets.	

RMFS	Labor rate for manufacturing support, including overhead. This category includes production control, industrial engineering, scheduling and shop loading, estimating, trade studies, budgeting and manpower analysis, and manufacturing program management.
RFBS	Labor rate for fabrication support services, including overhead. This category includes mechinists, technicians and mechanics necessary in the fabrication and test of support equipment and factory test equipment.
RTDE	Labor rate for tool design, including overhead. This category includes tool and fixture design, numerical control programs and methods engineering.
RTFB	Labor rate for tool fabrication including overhead. This category includes the skills required for fabrication of tools and fixtures.
RQCL	Labor rate for quality control, including overhead. This category includes quality assurance management, quality engineering, procurement control, inspection operations, quality control laboratory and measurement standards.

ALL RATES IN DOLLARS/HOUR

APU	Auxiliary power unit production cost for the 100th unit. 1975 \$
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LR AF	Learning Curve Slope - Structure	Decimal
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A log linear plot of unit cost vs quantity representing learning experience, i.e., the expected increase in productivity, as measured by time to do a particular job, resulting from repetitive effort. The slope represents the ratio of unit cost of the 2Nth unit to unit cost of the Nth unit.

ENTWR	Engine Thrust to Weight Ratio	Ratio
-------	----------------------------------	-------

Maximum SLS uninstalled engine thrust divided by engine dry weight.

TIT	Turbine Inlet Temperature	Degrees R
	Maximum total gas temperature leaving the first stage turbine stators in degrees Rankine.	
SLM	The maximum design mach number of the engine at sea level on a standard day.	
AVIF	Avionics Inflation Factor (Decimal)	
AVLR	Learning Curve Slope - Avionics	Decimal
ENLR	Learning Curve Slope - Engine	Decimal
DT	Number of years from start of full scale development through completion of military/model qualification test for engine only.	
EAF	Engine Airflow	Lb/Sec
	Total airflow through the engine at sea level static standard condition highest rating, including total fan flow of a turbofan engine.	
AFIF	Airframe Inflation Factor (Decimal)	
RΣDLRAF	Production Learning Rate for the Airframe during Research and Development (R&D)	
INS	Inertial Navigation System	Yes/No
ECM	Electronic Counter- measures capability	Yes/No
SPFAC	Spares Factor for Flight Test	
	Total number of engines required during development flight testing divided by (PROTO x NOENG). A number greater than 1. Suggested value = 1.5.	

LR EN R&D	Engine Production Learning Rate During R&D (Decimal)
ENIF	Engine Inflation Factor (Decimal)
%GEA	General and Administrative expense percentage (Decimal)
%PR	Percentage for manufacturer's profit (Decimal)
LR SUB	Learning Curve                      Decimal Slope - Sub-Systems
#B	Number of Bases
A/S/B =	All bases have an equal number of squadrons and air- craft per squadron.                      Yes/No
#Ba	Number of Bases with 1, 2, or 3 Squadrons (#B <sub>1</sub> , #B <sub>2</sub> , #B <sub>3</sub> )
S/B	Number of Squadrons per Base (1, 2, or 3)
A/S	Number of Aircraft per Squadron (12, 16, 18, 20, 22, 24, or 28)
#DAVS	Total number of different AN nomenclatured avionic sub- systems per aircraft. If there are two or more identical units, count that unit as one (1).
MLD	Minimum Landing                      Feet Distance  Basic mission first landing minimum ground roll distance at sea level.
CSW	Crew System Weight                      Lbs  Weight of furnishings and accommodations for personnel. Includes seats, bunks, oxygen, windshield wiper, instru- ment boards, consoles, fire detection and prevention, control stick and rudder pedals.
#PCP	Number of compartments on cargo/transport/tanker aircraft normally used for crew, relief crew, passen- gers/troops and cargo.

MVSQ	Mass Times Velocity Squared	Lbs x Knots <sup>2</sup>
	A relative measure of the energy required to stop an aircraft computed by multiplying first landing weight by the square of the landing speed. Landing weight is the maximum basic mission weight with which the aircraft is capable of landing.	
#LGB	Total number of main wheel brakes per aircraft.	
MAL	Maximum Altitude	Feet
	Highest service ceiling which the aircraft can attain while climbing at 100 FPM for any mission.	
%SUP	Fraction of aircraft operational or in the maintenance pipeline repaired. (Decimal)	
#LIM	Number of Landings per Month	
APUW	Auxiliary Power Unit Weight	Lbs
	Includes weight of airborne APU as well as plumbing, circuitry, ducts, supports, and fasteners for installation.	
ECSW	Total weight of the environmental control system including temperature control, pressurizing, ventilating, heating and cooling systems and anti-icing equipment.	
CT	Number of air cooling turbines in the aircraft air conditioning system.	
#G	Total number of engine, air turbine motor (ATM) and auxiliary power unit (APU) driven generator/alternators.	
#HP	Total number of power driven hydraulic pumps used in main and auxiliary hydraulic systems, power transfer units excluded.	
#HSPS	Total number of power driven main and auxiliary hydraulic supply systems.	

#ATM	Number of air turbine motors on the aircraft to drive generators/alternators.	
#PTU	Number of hydraulic power transfer units on an aircraft.	
FUSW	Fuel System Weight	Lbs
	Weight of fuel tank bladders, if any, and all fuel transfer lines, vents, drains, components and equipment installed.	
#FUBP	Number of pumps used in the fuel systems to distribute, jettison, feed and defuel. Excludes engine mounted pumps.	
#ANT	Total number of antennas required by aircraft communication and navigation subsystems.	
NOAC	Number of aircraft in the inventory that are operationally ready and which are not grounded for maintenance or spare parts. This quantity is obtained by multiplying the number of aircraft produced by an attrition factor and pipeline rate.	
G/H	Gallons of Fuel per Flight Hour	Gal/Hour
	Total fuel used for an average mission, divided by number of hours for an average mission.	
C/G	Cost of fuel per gallon in selected year dollars.	

## GRUMMAN OUTPUTS

### 1. Research Development Test & Evaluation

AFM        Airframe

AV         Avionics

EN         Engine

RED        Total RDT&E

### 2. Production

SUB PRD    Subsystem Production

AF PRD     Airframe Production

AV PRD     Avionics Production

EN PRD     Engine Production

G&A        General and Administrative Expenses

PROF       Profit

TOT PRD    Total Production

### 3. Initial Support

IS         Initial Support

STR        Structure

CR         Crew System

LG         Landing Gear

FC         Flight Controls

EI         Engine Installation

ECS        Environmental Control System

EL         Electrical

HYD	Hydraulic
FUEL	Fuel System
CH	Cargo Handling
ARM	Armament
APU	Auxiliary Power Unit
SSE	Special Support Equipment
IT	Initial Contractor Training
EN	Engines
AV	Avionics
TOT IS	Total Initial Support

#### 4. Operations and Support

POL	Petroleum, Oil, and Lubricants
BLM	Base Level Maintenance
RS	Replenishment Spares
DCR	Depot Component Repair
BLO	Base Level Operations
BLT	Base Level Training
PDM	Depot Airframe
OM	Other Maintenance
TOT OES	Total Operations and Support



### LEARNING CURVE INPUTS

UNIT/CUM?	Unit Curve or Cumulative Curve Equations?
# Units?	Total Number of Units?
Unit of Int?	Unit of Interest?
Unit 1 Cost?	First Unit Production Cost?
% Learn?	Learning Rate? (Decimal)

### LEARNING CURVE OUTPUTS

Un Cost =	Unit of Interest Production Cost
Tot Cost =	Total Production Cost of All Units

### LRU/SRU LOGISTICS SUPPORT COST INPUTS

DEVC	All nonrecurring and recurring engineering, tooling, manufacturing (e.g., breadboards, prototypes, flight vehicles, DT&E items, IOT&E items and spares to support RDT&E efforts), purchased equipment, quality control, allowance for changes, General and Administrative, and Profit associated with RDT&E funded efforts over the life cycle for the appropriate Work Breakdown Structure (WBS) elements.
SYS I	The cost of acquiring the production funded items including engineering, tooling, manufacturing, sub-contract, purchased parts and equipment, quality control, General and Administrative (G&A) and Profit.
SEC	The cost of equipment, vehicles and tools required to maintain and care for the item or portions of the item while not directly engaged in the performance of the items' mission including all effort associated with design development and production of the support equipment.

M	Number of intermediate repair locations (operating bases).
AOH	Average manhours to perform a shop bench check, screening, and fault verification of an item prior to initiating repair action or condemning the item.
POH	Expected operating hours for one month during the peak usage period for all items.
PIUP	Program Inventory Usage Period. Operational service life in years.
UC	Expected unit cost (including G&A and Profit) of the item at the time of initial spares provisioning.
W	Item unit weight in pounds.
MTBD	Mean Time Between Demand in operating hours. The average time between demand for supply support expressed in operating hours.
MTBR	Mean Time Between Removals Expressed in operating hours.
NRTS	Fraction of removed items expected to be returned to the depot for repair or condemnation.
RTS	Fraction of removed items expected to be repaired at base level.
COND	Fraction of failed items expected to result in condemnation at base and depot.
PAMH	Average manhours expended on the installed equipment for preparation and assessment to the item; for example, jacking, unbuttoning, removal of other units and hook up of support equipment.
RMH	Average manhours to fault isolate, remove, and replace the item on the installed equipment and verify restoration of the equipment to operational status.
SMI	Operating hour intervals between scheduled, periodic, or phased inspections on the installed item.

SMH	Average manhours to perform a scheduled, periodic, or phased inspection of the installed item.
BCMH	Average manhours to perform a shop bench check, screening, and fault verification of an item prior to initiating repair action or condemning the item.
BMH	Average manhours to perform intermediate level (base shop) maintenance on a removed item including fault isolation, repair, and verification.
BMC	Average direct material cost to repair an item at base level including direct material cost of repairing lower level assemblies.
BRCT	Average Base Repair Cycle Time in months. The elapsed time for an item repaired at the base from removal of the failed item until it is returned to base serviceable stock (less time awaiting parts). For items of a "black box" variety (e.g., avionics LRUs), the repair of which normally consists of removal and replacement of "plug-in" components (SRUs), BRCT = 0.13 months (4 days). For other, nonmodular components, BRCT = 0.20 months (6 days).
DMH	Average manhours to perform depot-level maintenance on a removed item including fault isolation, repair, and verification.
DMC	Average direct material cost to repair an item at depot level including direct material cost of repairing lower level assemblies.
PA	Number of new "P" coded (i.e. National Stock Number has not been established) reparable assemblies within the item.
PP	Number of new "P" coded consumable items within this item.
PCB	Number of consumable items within this item that will be stocked at base level for the first time.

**OST** Average Order and Shipping Time in months. The elapsed time between the initiation of a request for a serviceable item and its receipt by the requesting activity. The value of OST is a function of the base location (CONUS and/or OVERSEAS) and therefore a weighted average value must be calculated as shown below:

$$\text{OST}_{WT} = (\% \text{ CONUS BASES})(.4 \text{ months}) + \\ (\% \text{ OVERSEAS BASES})(.53 \text{ months})$$

The .4 months for CONUS and .53 months for overseas bases are standard factors. (Ref AFLCR 173-10)

**DRCT** Average depot repair cycle time in months. The elapsed time for a NRTS item from removal of the failed item until it is made available to depot serviceable stock. This includes the time required for base-to-depot transportation and handling and the shop flow time within the specialized repair activity required to repair the item. (Ref AFLCP 173-10)

**BLR** Base Labor Rate including direct labor and indirect labor and material costs. (Ref AFLC Pamphlet 173-10, dated 28 Aug 1980)

**DLR** Depot Labor Rate including direct labor and indirect labor and material costs. (Ref AFLCP 173-10)

**PSC** Average Packing and Shipping Cost. The value of PSC is a function of the shipping location (CONUS &/or OVERSEAS) and therefore a weighted average value must be calculated as shown below:

$$\text{PSC}_{WT} = (\% \text{ CONUS BASES})(\$ .72/\text{lb}) + \\ (\% \text{ OVERSEAS BASES})(\$ 1.49/\text{lb})$$

**SA** Annual base supply line item inventory management cost. (Ref AFLCP 173-10)

**IMC** Initial management cost to introduce a new line item of supply (assembly or piece part) into the Government inventory. (Ref AFLCP 173-10)

RMC        Recurring Management Cost to maintain a line item of supply (assembly or piece part) in the wholesale inventory system. (Ref AFLCP 173-10)

LRU/SRU LOGISTICS SUPPORT COST OUTPUTS

BSC	The cost to provide base repair pipeline spares for all bases.
BSTK	The number of spares required for each base to fill the base repair pipeline including a safety stock to protect against random fluctuations in demand.
DSC	The cost to provide depot repair pipeline spares.
DSTK	The number of spares required to fill the depot repair pipeline.
SIC	The cost of support equipment, base spares and depot spares.
TPC	The total cost of system investment and support investment.
BMHC	The cost of base maintenance manhours (direct and indirect) over the life cycle.
BMMH	Direct labor manhours per year to accomplish base-level repairs.
PMSH	Direct intermediate level (base shop) manhours for the peak month.
BMHC	Cost of material to repair failed units at the base.
DMHC	The cost to accomplish depot-level maintenance of failed items over the program inventory usage period.
DMMH	The direct labor manhours per year to accomplish depot-level repairs.
DMMC	The cost of material to repair failed items at the depot level.

SDTC	The cost of roundtrip transportation of items sent to the depot for repair.
CSC	The cost of spares required over the life cycle to replace condemned items.
QSC	Quantity of spares required over the life cycle to replace condemned items.
IMCC	The cost to enter new line items of supply into the Government inventory and to manage these over the life of the equipment, and the cost of base level supply management of these new items.
TOC	The total cost of ownership including, base maintenance manhour and material costs, depot maintenance manhour and material cost, second destination transportation costs, condemnation spares costs and inventory management costs.
LCC	The total cost to the Government for an item over its full life, including the cost of development, procurement and ownership as computed by the model.

#### ORLA INPUTS

#### Optimum Repair Level Analysis

BRCYT	Base Repair Cycle Time (Modular LRU 0.20 month - Non Modular LRU 0.33 month).
LWRD	Depot Labor Wage Rate
LURI	Intermediate Labor Wage Rate
DSST	Depot Safety Stock Level (months)
NTDPRD	Number of technical data pages required at depot level .
NTDPRI	Number of technical data pages required at intermediate level .
MCFA	Management cost to introduce new FSN assembly into Air Force inventory .

MCFP	Management Cost to introduce new FSM part into Air Force inventory
NRA	Number of repairable assemblies introduced into inventory
NNRA	Number of non-repairable parts introduced into inventory
MTBCT	Mean Time Between Corrective Tasks (hours)
MTBF	Mean Time Between Failures (hours)
NB	Number of bases
NBC	Number of Bases Conus
NBOS	Number of Bases Overseas
OSTC	Order and Shipping Time (Continental U.S.)
OSTOS	Order and Shipping Time Overseas
IL	Planned Inventory Usage Period
FRCPP	Fraction of average repair cost comprised of known piece parts
PSLRC	Packing and Shipping Labor Rate (Continental U.S.)
PSLROS	Packing and Shipping Labor Rate Overseas
PSMRC	Packing and Shipping Material Rate (Continental U.S.)
PSMROS	Packing and Shipping Material Rate Overseas
PWRC	Packing Weight Ratio (Continental U.S.)
PWROS	Packing Weight Ratio Overseas
QPA	Quantity per Assembly (used with UE)
MCA	Annual Supply Management Cost for Assembly
MHCT	Required Man Hours per Corrective Task (AVG)
MCP	Annual Supply Management Cost for Part

DRPT	Depot Repair Pipeline Time (months)
FSAC	Annual Field Supply Administration Cost
CRM	Cost of Repair Material (dollars per task) including Piece Parts
SSRC	Shipping Rate - Continental U.S. - Surface
SSROS	Shipping Rate Overseas
RMW	Weight of Repair Materials per repair task (lbs)
TDOCP	Technical Data Origination Cost per page
UC	Unit Cost (dollars)
U/B	Units per Operating Element (station sets per base)
OH/M	Usage Rate (operating hours per month)
UW	Unit Weight (lbs)
PTRD	Annual personnel turnover rate at Depot level
PTRI	Annual personnel turnover rate at Intermediate level
PTTD	Number of intermediate personnel to be trained
PTTI	Number of depot personnel to be trained
DTD	Duration of depot level training (weeks)
DTI	Depot level training instruction and material cost
TCPD	Duration of intermediate level training (weeks)
TCPI	Intermediate level training instruction and material cost per man



### LIFE CYCLE COMPONENT RELIABILITY INPUTS

#LEV	Number of Levels
#CIR/LEV	Number of circuits at the level
COM MTBF=?	Are the component MTBFs equal?
S/P?	Are the components configured in series or parallel?
#COM/CIR?	Number of components in the circuit?
#PAR CIR?	Number of parallel circuits?
REL?	Component reliability if known.
MTBF?	Component mean time between failure if reliability unknown.
T?	Time interval
#Com/Ser?	Number of components in the series.

### LIFE CYCLE COMPONENT RELIABILITY OUTPUTS

Reliability =	Component/Circuit Reliability
System Reliability =	Total System being considered

APPENDIX B  
PROGRAM LISTINGS

RAND

01♦LBL "RAN	RAND AIRFRAME DEVELOPMENT AND
D"	PROCUREMENT
02 5	
03 STO 01	
04 "HRS ENG	OUTPUT LABELS
R"	
05 ASTO 08	
06 "HRS TOO	
L"	
07 ASTO 12	
08 "HRS LAB	
R"	
09 ASTO 16	
10 "\$ MATL"	
11 ASTO 20	
12 "\$ DEV S	
UP"	
13 ASTO 24	
14 "\$ PROG"	
15 ASTO 28	
16 1.27	
17 STO 31	
18 "\$ FL TS	
T"	
19 ASTO 32	
20 8.00001	
21 STO 34	
22 "EM/UN W	EMPTY OR UNIT WEIGHT FORMULAS?
GT?"	
23 PROMPT	
24 ASTO Y	
25 "EM"	
26 ASTO X	
27 X=Y?	
28 XEQ 09	
29 XEQ 10	
30♦LBL 11	
31 "CARGO?"	CARGO TYPE AIRCRAFT?
32 PROMPT	
33 ASTO Y	
34 "Y"	
35 ASTO X	
36 X=Y?	
37 SF 02	
38 "MAX SPD	MAXIMUM SPEED IN KNOTS?
KNOTS?"	
39 PROMPT	
40 STO 03	
41 "NUM FLT	NUMBER OF FLIGHT TEST AIRCRAFT?
TEST?"	
42 PROMPT	
43 STO 04	

44♦LBL 01	FORMULA LOOP
45 CLA	
46 RCL IND	
01	
47 XEQ 08	
48 RCL 02	
49 RCL IND	
01	
50 XEQ 08	
51 Y↑X	
52 *	
53 RCL 03	
54 RCL IND	
01	
55 XEQ 08	
56 Y↑X	
57 *	
58 RCL 01	
59 32	LENGTHEN EQUATION FOR FLIGHT TEST
60 X=Y?	
61 XEQ 03	
62 RDN	
63 RDN	
64 RCL 01	
65 16	
66 X=Y?	
67 XEQ 06	STORE LABOR OUTPUT
68 RDN	
69 RDN	
70 GTO 02	
71♦LBL 02	
72 ARCL IND	
01	
73 XEQ 08	
74 XEQ 88	LABEL OUTPUTS (OUTPUTS MUST BE MULTIPLIED
75 DSE 34	BY LABOR RATES AND INFLATION FACTORS AS
76 GTO 01	APPLICABLE)
77 STOP	
78♦LBL 88	WORKING LABELS
79 1000	
80 *	
81 FS? 02	
82 XEQ 12	
83 "t="	
84 ARCL X	
85 AVIEW	
86 FS? 55	
87 STOP	
88 RCL 01	
89 33	
90 X=Y?	
91 XEQ 05	
92 RDN	

```

93 RDN
94 RTN

95♦LBL 03
96 RDN
97 RDN
98 RCL 04
99 RCL 33
100 Y↑X
101 *
102 GTO 02

103♦LBL 04
104 .0638
105 GTO 07

106♦LBL 05
107 RDN
108 RDN
109 FS? 02
110 XEQ 04
111 .125

112♦LBL 07
113 CF 02
114 RCL 36
115 *
116 "QC"
117 XEQ 88

118♦LBL 06
119 RDN
120 RDN
121 STO 36
122 GTO 02

123♦LBL 08
124 1
125 ST+ 01
126 RDN
127 RTN

128♦LBL 09
129 .00355
130 STO 05
131 .787
132 STO 06
133 .98
134 STO 07
135 .0221
136 STO 09
137 .778
138 STO 10
139 .68
140 STO 11

```

FIXED VARIABLES FOR EMPTY WEIGHT

141 .165  
 142 STO 13  
 143 .82  
 144 STO 14  
 145 .456  
 146 STO 15  
 147 .299  
 148 STO 17  
 149 .954  
 150 STO 18  
 151 .526  
 152 STO 19  
 153 .00417  
 154 STO 21  
 155 .818  
 156 STO 22  
 157 1.23  
 158 STO 23  
 159 2.19  
 160 STO 25  
 161 .828  
 162 STO 26  
 163 .696  
 164 STO 27  
 165 .000293  
 166 STO 29  
 167 .644  
 168 STO 30  
 169 .767  
 170 STO 33  
 171 "EMP WGT  
       ?"

172 PROMPT  
 173 STO 02  
 174 GT0 11

175♦LBL 10  
 176 .00445  
 177 STO 05  
 178 .758  
 179 STO 06  
 180 1.03  
 181 STO 07  
 182 .0296  
 183 STO 09  
 184 .734  
 185 STO 10  
 186 .743  
 187 STO 11  
 188 .235  
 189 STO 13  
 190 .77  
 191 STO 14  
 192 .522  
 193 STO 15

FIXED VARIABLES FOR UNIT WEIGHT

194 .404  
195 STO 17  
196 .905  
197 STO 18  
198 .604  
199 STO 19  
200 .00761  
201 STO 21  
202 .761  
203 STO 22  
204 1.28  
205 STO 23  
206 3.56  
207 STO 25  
208 .779  
209 STO 26  
210 .745  
211 STO 27  
212 .000617  
213 STO 29  
214 .584  
215 STO 30  
216 .805  
217 STO 33  
218 "UNIT WG  
T?"  
219 PROMPT  
220 STO 02  
221 GT0 11  
  
222♦LBL 12  
223 .75  
224 \*  
225 RTN  
226 .END.



NORTHROP

01♦LBL "NOR"	NORTHROP FIGHTER/ATTACK MODEL
02 0	
03 STO 50	
04 3	
05 STO 51	
06 "DTJ"	SELECT ENGINE TYPE
07 XEQ 04	
08 XEQ 09	
09 "ABTF"	
10 XEQ 04	
11 XEQ 09	
12 "ABTJ"	
13 XEQ 04	
14♦LBL 08	
15 SF 10	
16 3	
17 STO 51	
18 "AW-A/A- A/G"	SELECT AIRCRAFT FUNCTION
19 XEQ 04	
20 XEQ 09	
21 "AW-SF"	
22 XEQ 04	
23 XEQ 09	
24 "VFR-SF"	
25 XEQ 04	
26♦LBL 07	
27 "N F"	NEW FIGHTER?
28 XEQ 04	
29 SF 08	
30 "S S"	SINGLE SEAT?
31 XEQ 04	
32♦LBL 19	
33 "AF LR"	AIRFRAME LEARNING RATE? (DECIMAL)
34 XEQ 01	
35 STO 00	
36 "EW"	EMPTY WEIGHT?
37 XEQ 02	
38 STO 01	
39 "%G"	PERCENT GRAPHITE? (DECIMAL)
40 XEQ 02	
41 XEQ 03	
42 1700	
43 *	
44 STO 02	
45 "%T"	PERCENT TITANIUM? (DECIMAL)
46 XEQ 02	
47 XEQ 03	
48 10700	
49 *	
50 ST+ 02	

51 "%0"	PERCENT OTHER ADVANCED MATERIAL?
52 XEQ 02	(DECIMAL)
53 XEQ 03	
54 2150	
55 *	
56 ST+ 02	
57 RCL 02	
58 STO 08	
59 "AF 750"	AIRFRAME COST AT 750 AIRCRAFT
60 XEQ 00	
61 "EN LR"	ENGINE LEARNING RATE? (DECIMAL)
62 XEQ 01	
63 STO 03	
64 FS? 02	
65 GTO 11	
66 "FMIL"	DRY TURBOJET
67 XEQ 02	
68 STO 37	
69 .96	
70 Y↑X	
71 58	
72 *	
73 FS? 00	
74 GTO 10	
75 "BPR"	DRY TURBOFAN
76 XEQ 02	
77 1	
78 +	
79 FS? 01	
80 GTO 12	
81 -.15	
82 Y↑X	
83 *	
84 GTO 10	
85♦LBL 12	AFTERBURNER TURBOFAN
86 .52	
87 Y↑X	
88 *	
89 "FMAX"	
90 XEQ 02	
91 RCL 37	
92 -	
93 .08	
94 Y↑X	
95 *	
96 GTO 10	
97♦LBL 11	AFTERBURNER TURBOJET
98 "FMIL"	
99 XEQ 02	
100 STO 37	
101 .96	
102 Y↑X	
103 64	

104 \*  
 105 "FMAX"  
 106 XEQ 02  
 107 RCL 37  
 108 -  
 109 .06  
 110 Y↑X  
 111 \*

112♦LBL 10  
 113 "PU 1000"

UNIT COST AT 1000 ENGINES

114 XEQ 00  
 115 "N"  
 116 XEQ 02  
 117 STO 38  
 118 RCL 03  
 119 1  
 120 +  
 121 STO 04  
 122 Y↑X  
 123 \*  
 124 .75  
 125 RCL 03  
 126 Y↑X  
 127 \*  
 128 RCL 04  
 129 /  
 130 STO 05  
 131 ST+ 08  
 132 "P 750"  
 133 XEQ 00  
 134 "AV LR"  
 135 XEQ 01  
 136 STO 06  
 137 FS? 03  
 138 1500  
 139 FS? 04  
 140 900  
 141 FS? 05  
 142 600  
 143 "AV WT"  
 144 XEQ 02  
 145 \*  
 146 STO 07  
 147 ST+ 08  
 148 "E 750"  
 149 XEQ 00  
 150 RCL 08  
 151 "F 750"  
 152 XEQ 00  
 153 RCL 08  
 154 1.411  
 155 Y↑X  
 156 .376

ENGINE PER AIRCRAFT COST AT 750 AIRCRAFT

AVIONICS LEARNING RATE? (DECIMAL)

AW/AG/AA

AW/SF

VFR/SF

UNINSTALLED AVIONICS WEIGHT?

AVIONICS PER AIRCRAFT COST AT 750 AIRCRAFT

AVERAGE FLYAWAY COST AT 750 AIRCRAFT

$$RDT\&E = .376[F_{750}^{1.411}]$$

157 *	
158 STO 09	
159 STO 27	
160 "RED"	RDT&E OUTPUT 77 \$
161 XEQ 00	
162 "UF"	
163 XEQ 02	
164 "NYRS"	
165 XEQ 02	
166 *	
167 STO 11	
168 "UR"	
169 XEQ 02	
170 STO 12	
171 *	
172 STO 13	
173 .0260	FLYING HOUR MAINT.
174 STO 14	
175 .6859	
176 STO 15	
177 FS? 06	
178 XEQ 13	
179 .182 E06	OTHER RECURRING MAINT.
180 STO 17	
181 8.9	
182 STO 18	
183 .5647	
184 STO 19	
185 9.96 E06	
186 STO 20	
187 FS? 07	
188 XEQ 14	
189 .00142	UNIT EQUIPMENT RELATED MAINT.
190 STO 21	
191 1.158	
192 STO 22	
193 FS? 06	
194 XEQ 15	
195 "\$/GAL"	POL
196 XEQ 02	
197 STO 39	
198 .0032	
199 *	
200 RCL 38	
201 "F*S"	MILITARY RATED THRUST/ENGINE *
202 XEQ 02	SPECIFIC FUEL CONSUMPTION, UNINSTALLED
203 *	
204 STO 40	
205 .577	
206 Y↑X	
207 *	
208 RCL 01	
209 "L/D"	
210 XEQ 02	
211 /	

212	STO	41	
213	1.01		
214	Y↑X		
215	*		
216	FS?	01	
217	XEQ	16	
218	FS?	02	
219	XEQ	16	
220	STO	23	
221	"POL\$ / FH		POL COST/FLYING HOUR 77 \$
222	XEQ	00	
223	"Q"		NUMBER OF AIRCRAFT OF INTEREST?
224	XEQ	02	
225	STO	24	
226	750		
227	/		
228	STO	25	
229	RCL	00	
230	Y↑X		
231	RCL	24	
232	RCL	02	
233	XEQ	17	
234	STO	28	
235	STO	26	
236	"AQ"		AIRFRAME COST 77 \$
237	XEQ	00	
238	RCL	25	
239	RCL	03	
240	Y↑X		
241	RCL	24	
242	RCL	05	
243	XEQ	17	
244	STO	29	
245	ST+	26	
246	"PQ"		ENGINE COST 77 \$
247	XEQ	00	
248	RCL	25	
249	RCL	06	
250	Y↑X		
251	RCL	24	
252	RCL	07	
253	XEQ	17	
254	STO	30	
255	ST+	26	
256	"EQ"		AVIONICS COST 77 \$
257	XEQ	00	
258	RCL	26	
259	ST+	27	
260	"FQ"		AIRCRAFT COST 77 \$
261	XEQ	00	
262	RCL	26	
263	.37		
264	*		
265	STO	31	

266	ST+	27	
267	"I OES"		INITIAL OPERATIONS AND SUPPORT COST
268	XEQ	00	77 \$
269	RCL	08	
270	RCL	15	
271	Y↑X		
272	RCL	14	
273	RCL	24	
274	RCL	13	
275	XEQ	18	
276	STO	32	
277	ST+	27	
278	"FH OES"		O&S COST /FLYING HOUR 77 \$
279	XEQ	00	
280	RCL	11	
281	.0045		
282	RCL	26	
283	XEQ	17	
284	STO	33	
285	ST+	27	
286	"CL IV M		CLASS IV MODIFICATIONS COST 77 \$
	"		
287	XEQ	00	
288	RCL	08	
289	RCL	22	
290	Y↑X		
291	RCL	11	
292	RCL	24	
293	RCL	21	
294	XEQ	18	
295	STO	34	
296	ST+	27	
297	"UE OES"		UNIT EQUIPMENT O&S COST 77 \$
298	XEQ	00	
299	RCL	13	
300	RCL	24	
301	RCL	23	
302	XEQ	17	
303	STO	35	
304	ST+	27	
305	"POL OES"		POL O&S COST 77 \$
	"		
306	XEQ	00	
307	RCL	08	
308	RCL	19	
309	Y↑X		
310	RCL	18	
311	*		
312	RCL	20	
313	RCL	12	
314	/		
315	-		
316	RCL	17	
317	+		
318	RCL	11	

319 RCL 24  
320 XEQ 17  
321 STO 36  
322 ST+ 27  
323 "OTH O&S"

OTHER O&S COST 77 \$

324 XEQ 00  
325 RCL 27  
326 "TLCC"  
327 XEQ 00  
328 CF 01  
329 CF 02  
330 CF 03  
331 CF 04  
332 CF 05  
333 CF 06  
334 CF 07  
335 CF 08  
336 CF 09  
337 CF 10  
338 "END"  
339 RVIEW  
340 STOP

TOTAL LIFE CYCLE COST 77 \$

CLEAR FLAGS

341♦LBL 00  
342 "I="   
343 ARCL X  
344 RVIEW  
345 STOP  
346 RTN

WORKING LABELS

347♦LBL 01  
348 PROMPT  
349 LN  
350 2  
351 LN  
352 /  
353 RTN

354♦LBL 02  
355 "I?"  
356 PROMPT  
357 RTN

358♦LBL 03  
359 RCL 01  
360 \*  
361 .76  
362 Y↑X  
363 RTN

364♦LBL 04  
365 "I?"  
366 PROMPT  
367 ASTO Y



368 "Y"  
369 ASTO X  
370 X=Y?  
371 XEQ 05  
372 XEQ 06  
373 RTN

374♦LBL 05  
375 SF IND 5  
0

376 RCL 51  
377 ST+ 50  
378 FS? 08  
379 GT0 19  
380 FS? 10  
381 GT0 07  
382 GT0 08

383♦LBL 06  
384 1  
385 ST+ 50  
386 RTN

387♦LBL 09  
388 1  
389 ST- 51  
390 RTN

391♦LBL 13  
392 .000832  
393 STO 14  
394 .8912  
395 STO 15  
396 RTN

397♦LBL 14  
398 .14 E06  
399 STO 17  
400 RTN

401♦LBL 15  
402 4.56  
403 STO 21  
404 .6222  
405 STO 22  
406 RTN

407♦LBL 16  
408 RCL 39  
409 1.5  
410 \*  
411 RCL 40  
412 .187  
413 Y↑X  
414 \*

415 RCL 41  
416 .627  
417 Y↑X  
418 \*  
419 RTN

420♦LBL 17  
421 \*  
422 \*  
423 RTN

424♦LBL 18  
425 \*  
426 \*  
427 \*  
428 RTN  
429 .END.

GRUMMAN

01♦LBL "L1"	GRUMMAN WORKING LABELS:
02♦LBL "15"	INPUT
03 STO IND	
00	
04 1	
05 ST+ 00	
06 RDN	
07 RTN	
08♦LBL "16"	
09 "F2"	
10 PROMPT	
11 STO IND	
01	
12 1	
13 ST+ 01	
14 RDN	
15 RTN	
16♦LBL "18"	
17 STO IND	
01	
18 1	
19 ST+ 01	
20 RDN	
21 RTN	
22 .END.	

01♦LBL "L2"	REPETITIVE FORMULAS
02♦LBL "4"	
03 1	
04 ST+ 00	
05 RDN	
06 RTN	
07♦LBL "7"	
08 XEQ "12"	
09 XEQ "13"	
10 XEQ "13"	
11 XEQ "14"	
12 RTN	
13♦LBL "8"	
14 1	
15 ST+ 00	
16 ST+ 01	
17 RDN	
18 RTN	
19♦LBL "9"	
20 XEQ "12"	
21 XEQ "13"	
22 XEQ "14"	
23 RTN	
24♦LBL "12"	
25 RCL IND	
01	
26 RCL IND	
00	

```

27 Y↑X
28 XEQ "8"
29 RTN
30♦LBL "13"
31 RCL IND
01
32 RCL IND
00
33 Y↑X
34 *
35 XEQ "8"
36 RTN
37♦LBL "14"
38 RCL IND
00
39 *
40 XEQ "4"
41 RTN
42♦LBL "27"
43 RCL 44
44 RCL 43
45 *
46 *
47 RCL 30
48 *
49 RCL 02
50 *
51 RTN
52♦LBL "1"
53 RCL 02
54 *
55 RTN
56♦LBL "29"
57 RCL 48
58 GTO "31"
59♦LBL "30"
60 RCL 51
61 GTO "31"
62 .END.

```

```

01♦LBL "L3"
02♦LBL "10"
03 XEQ "12"
04 XEQ "14"
05 RTN
06♦LBL "11"
07 XEQ "12"
08 XEQ "13"
09 XEQ "13"
10 XEQ "13"
11 XEQ "14"
12 RTN
13♦LBL "17"
14 1

```

#### REPETITIVE FORMULAS

```

15 ST+ 01
16 RDN
17 RTN
18 .END.

```

```

01♦LBL "L4"      MULTIPLE SUMMATION
02♦LBL "34"
03 +
04 +
05 +
06 RTN-
07♦LBL "35"
08 +
09 +
10 RTN
11 .END.

```

```

01♦LBL "L5"      REPETITIVE FORMULAS
02♦LBL "39"
03 RCL IND
01
04 RCL IND
00
05 *
06 XEQ "8"
07 RTN
08♦LBL "4"
09 1
10 ST+ 00
11 RDN
12 RTN
13♦LBL "8"
14 1
15 ST+ 00
16 ST+ 01
17 RDN
18 RTN
19♦LBL "40"
20 RCL IND
00
21 +
22 XEQ "4"
23 RTN
24♦LBL "41"
25 RCL IND
00
26 -
27 XEQ "4"
28 RTN
29♦LBL "42"
30 XEQ "39"
31 XEQ "39"
32 +
33 RTN

```

```

34♦LBL "43"
35 XEQ "39"
36 XEQ "39"
37 -
38 RTN
39♦LBL "44"
40 XEQ "42"
41 XEQ "39"
42 -
43 XEQ "40"
44 RTN
45♦LBL "45"
46 XEQ "42"
47 XEQ "40"
48 RTN
49♦LBL "46"
50 XEQ "42"
51 XEQ "41"
52 RTN
53♦LBL "47"
54 XEQ "43"
55 XEQ "39"
56 +
57 XEQ "40"
58 RTN
59♦LBL "48"
60 XEQ "43"
61 XEQ "40"
62 RTN
63♦LBL "49"
64 XEQ "43"
65 XEQ "41"
66 RTN
67 .END.

```

#### FLAG SET / REPETITIVE FORMULAS

```

01♦LBL "L6"
02♦LBL "36"
03 SF 01
04 SF 03
05 RTN
06♦LBL "37"
07 RCL IND
01
08 XEQ "17"
09 +
10 RTN
11 .END.

```

#### REPETITIVE FORMULAS

```

01♦LBL "L7"
02♦LBL "33"
03 *
04 +
05 XEQ "17"
06 RTN

```

07 .END.

01♦LBL "L8"  
02♦LBL "32"  
03 "ECM?"  
04 PROMPT  
05 ASTO Y  
06 "N"  
07 ASTO X  
08 X=Y?  
09 GTO "HI"  
10 RCL 11  
11 1.5  
12 \*  
13 STO 12  
14 GTO "IH"  
15 .END.

#### AVIONICS MULTIPLE

01♦LBL "L9"  
02♦LBL "21"  
03 RCL IND  
00  
04 RCL IND  
01  
05 \*  
06 XEQ "8"  
07 +  
08 RTN  
09♦LBL "23"  
10 RCL IND  
00  
11 XEQ "4"  
12 XEQ "21"  
13 XEQ "21"  
14 XEQ "21"  
15 XEQ "21"  
16 XEQ "21"  
17 RTN  
18♦LBL "22"  
19 XEQ "23"  
20 XEQ "21"  
21 RTN  
22♦LBL "24"  
23 XEQ "25"  
24 XEQ "21"  
25 RTN  
26♦LBL "25"  
27 XEQ "22"  
28 XEQ "21"  
29 RTN  
30 .END.

#### REPETITIVE FORMULAS

01♦LBL "T"  
02 RCL 15

#### PROGRESS CURVE APPLICATION



03 RCL 31  
04 1  
05 +  
06 Y↑X  
07 1  
08 -  
09 RCL 31  
10 1  
11 +  
12 /  
13 RCL 15  
14 RCL 31  
15 Y↑X  
16 1  
17 +  
18 2  
19 /  
20 +  
21 RCL 15  
22 RCL 31  
23 1  
24 -  
25 Y↑X  
26 1  
27 -  
28 RCL 31  
29 \*  
30 12  
31 /  
32 +  
33 RCL 31  
34 2  
35 -  
36 RCL 31  
37 1  
38 -  
39 \*  
40 RCL 31  
41 \*  
42 RCL 31  
43 3  
44 -  
45 RCL 15  
46 X<>Y  
47 Y↑X  
48 1  
49 -  
50 \*  
51 720  
52 /  
53 -  
54 RCL 18  
55 \*  
56 RTN

57 .END.

01♦LBL "R"  
02 100  
03 STO 00  
04 150  
05 STO 01  
06 RTN  
07♦LBL "O"  
08 "t="   
09 ARCL X  
10 RVIEW  
11 STOP  
12 RTN  
13 END

RESET EXTENDED MEMORY

LABEL OUTPUT

01♦LBL "AM"  
02 174  
03 STO 99  
04 0  
05 STO IND  
99  
06 1  
07 ST+ 99  
08 RDN  
09 STO IND  
99  
10 1  
11 ST+ 99  
12 RDN  
13 STO IND  
99  
14 XEQ 14  
15 XEQ 19  
16 XEQ 19  
17 XEQ 19  
18 XEQ 15  
19 .99  
20 XEQ 13  
21 1.75  
22 XEQ 13  
23 .85  
24 XEQ 13  
25 .75  
26 XEQ 13  
27 1.24  
28 XEQ 13  
29 1.98  
30 XEQ 13  
31 1.53  
32 XEQ 13  
33 1.38  
34 XEQ 13  
35 1.73

ADVANCED MATERIAL ADJUSTMENT FACTORS

SET 174-176 TO 0

ENTER AM TABLE VALUES

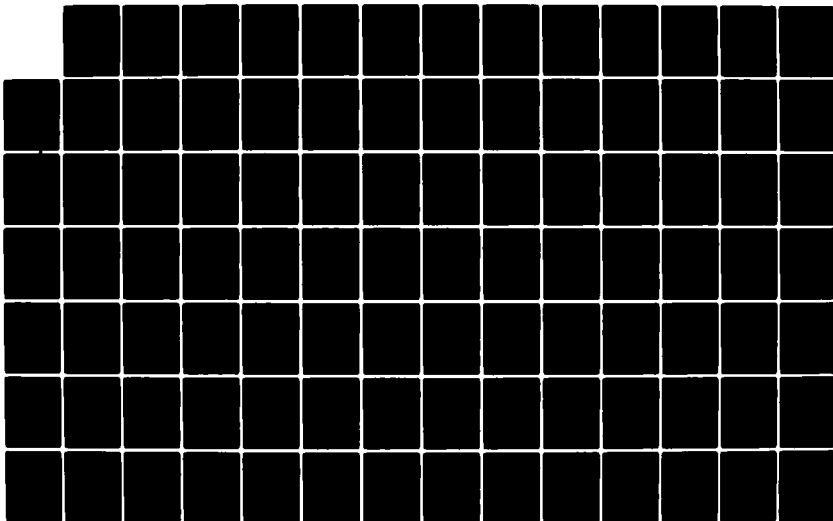
AD-A123 045

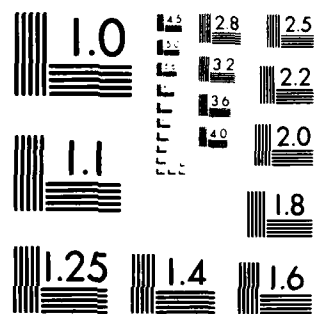
THE UTILITY OF HANDHELD PROGRAMMABLE CALCULATORS IN  
AIRCRAFT LIFE CYCLE C... (U) AIR FORCE INST OF TECH  
WRIGHT-PATTERSON AFB OH SCHOOL OF SYST... D P BROOKS  
SEP 82 AFIT-LSSR-41-82 F/G 1/0

2/3

UNCLASSIFIED

NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963-A

36 XEQ 13  
37 1.73  
38 XEQ 13  
39 2.65  
40 XEQ 13  
41 .79  
42 XEQ 13  
43 2.13  
44 XEQ 13  
45 3.02  
46 XEQ 13  
47 11.45  
48 XEQ 13  
49 .82  
50 XEQ 13  
51 1.72  
52 XEQ 13  
53 .95  
54 XEQ 13  
55 .86  
56 XEQ 13  
57 1.25  
58 XEQ 13  
59 2.1  
60 XEQ 13  
61 1.6  
62 XEQ 13  
63 1.38  
64 XEQ 13  
65 1.73  
66 XEQ 13  
67 1.73  
68 XEQ 13  
69 2.48  
70 XEQ 13  
71 .87  
72 XEQ 13  
73 2.44  
74 XEQ 13  
75 3.45  
76 XEQ 13  
77 13.1  
78 XEQ 13  
79 1.37  
80 XEQ 13  
81 1.64  
82 XEQ 13  
83 .95  
84 XEQ 13  
85 .89  
86 XEQ 13  
87 1.27  
88 XEQ 13  
89 1.74

90 XEQ 13  
 91 1.41  
 92 XEQ 13  
 93 1.38  
 94 XEQ 13  
 95 1.73  
 96 XEQ 13  
 97 1.73  
 98 XEQ 13  
 99 2.64  
 100 XEQ-13  
 101 .8  
 102 XEQ 13  
 103 2.18  
 104 XEQ 13  
 105 3.09  
 106 XEQ 13  
 107 11.73  
 108 XEQ 13  
 109 XEQ 06  
 110 XEQ 07  
 111 XEQ 08  
 112 XEQ 18  
 113 "W"  
 114 XEQ 09  
 115 "F"  
 116 XEQ 09  
 117 "N"  
 118 XEQ 09  
 119 "T"  
 120 XEQ 09  
 121 "TI"  
 122 XEQ 10  
 123 "S"  
 124 XEQ 10  
 125 "G"  
 126 XEQ 10  
 127 "GR"  
 128 XEQ 10  
 129 "B"  
 130 XEQ 10  
 131 XEQ 06  
 132 LBL 01  
 133 XEQ 05  
 134 XEQ 07  
 135 CLA  
 136 ARCL IND  
 00  
 137 RVIEW  
 138 PSE  
 139 PSE  
 140 XEQ 11  
 141 LBL 02  
 142 CLA

STORE ALPHA PROMPTS

VIEW STRUCTURE PROMPTS

INPUT MATERIAL %

143	ARCL	IND	
01			
144	"I%=?"		
145	PROMPT		
146	STO	IND	
02			
147	XEQ	12	
148	XEQ	03	
149	DSE	03	MATERIALS / STRUCTURE LOOP
150	GTO	02	
151	DSE	04	STRUCTURE LOOP
152	GTO	01	
153	XEQ	05	
154	XEQ	18	
155	XEQ	15	
156	XEQ	08	
157	15.0000	1	
158	STO	07	
159	3.0000	1	
160	STO	08	
161	XEQ	14	
162	LBL	04	% * TABLE VALUES
163	RCL	IND	
05			
164	RCL	IND	
02			
165	*		
166	ST+	IND	
06			
167	XEQ	03	
168	DSE	03	MATERIALS / STRUCTURE LOOP
169	GTO	04	
170	5		
171	ST-	02	
172	XEQ	05	
173	1		
174	ST+	06	
175	DSE	08	NACELLE REPEAT
176	GTO	04	
177	3		
178	ST-	06	
179	5		
180	ST+	02	
181	DSE	04	STRUCTURE LOOP
182	GTO	04	
183	GTO	16	
184	LBL	03	WORKING LABELS
185	1		
186	ST+	02	
187	ST+	05	
188	RTN		
189	LBL	05	
190	5.0000	1	
191	STO	03	

192 RTN  
193♦LBL 06  
194 100  
195 STO 00  
196 RTN  
197♦LBL 07  
198 104  
199 STO 01  
200 RTN  
201♦LBL 08  
202 109  
203 STO 02  
204 RTN  
205♦LBL 09  
206 ASTO IND  
00  
207 1  
208 ST+ 00  
209 RTN  
210♦LBL 10  
211 ASTO IND  
01  
212 1  
213 ST+ 01  
214 RTN  
215♦LBL 11  
216 1  
217 ST+ 00  
218 RTN  
219♦LBL 12  
220 1  
221 ST+ 01  
222 RTN  
223♦LBL 13  
224 STO IND  
05  
225 1  
226 ST+ 05  
227 RTN  
228♦LBL 14  
229 174  
230 STO 06  
231 RTN  
232♦LBL 15  
233 129  
234 STO 05  
235 RTN  
236♦LBL 17  
237 1  
238 ST+ 06  
239 RTN  
240♦LBL 18  
241 4.00001  
242 STO 04



243 RTN  
 244♦LBL 19  
 245 0  
 246 STO IND  
 06  
 247 XEQ 17  
 248 RTN  
 249♦LBL 16  
 250 XEQ 14  
 251 RCL IND  
 06  
 252 STO 40  
 253 STOP  
 254 XEQ 17  
 255 RCL IND  
 06  
 256 STO 41  
 257 STOP  
 258 XEQ 17  
 259 RCL IND  
 06  
 260 STO 42  
 261 "AM"  
 262 PCLPS  
 263 END

VIEW OUTPUT

STORE 174-176 IN 40-42

01♦LBL "DA"  
 02 99  
 03 STO 35  
 04 CLA  
 05 "AL"  
 06 XEQ 01  
 07 "AT"  
 08 XEQ 01  
 09 "AVIW"  
 10 XEQ 01  
 11 "AVW"  
 12 XEQ 01  
 13 "ATBO"  
 14 XEQ 01  
 15 "B/H"  
 16 XEQ 01  
 17 "CW"  
 18 XEQ 01  
 19 "CFA"  
 20 XEQ 01  
 21 "CV"  
 22 XEQ 01  
 23 "EPR"  
 24 XEQ 01  
 25 "FFY"  
 26 XEQ 01  
 27 "FD"  
 28 XEQ 01  
 29 "FY"

PERMANENT DATA INPUT

STORE IN REGISTERS 99-35

30 XEQ 01  
31 "FLVA"  
32 XEQ 01  
33 "H/M"  
34 XEQ 01  
35 "IFLW"  
36 XEQ 01  
37 "LW"  
38 XEQ 01  
39 "L+S"  
40 XEQ 01  
41 "MM"  
42 XEQ 01  
43 "MOT"  
44 XEQ 01  
45 "\*ACT"  
46 XEQ 01  
47 "\*APU"  
48 XEQ 01  
49 "\*C/A"  
50 XEQ 01  
51 "\*CLS"  
52 XEQ 01  
53 "NOENG"  
54 "\*EN"  
55 XEQ 01  
56 "\*EX"  
57 XEQ 01  
58 "\*G+S"  
59 XEQ 01  
60 "\*HS"  
61 XEQ 01  
62 "\*IT"  
63 XEQ 01  
64 "\*S"  
65 XEQ 01  
66 "\*W"  
67 XEQ 01  
68 "ULF"  
69 XEQ 01  
70 "\*P"  
71 XEQ 01  
72 "RMFG"  
73 XEQ 01  
74 "SS"  
75 XEQ 01  
76 "TFF"  
77 XEQ 01  
78 "TGWC"  
79 XEQ 01  
80 "TGWM"  
81 XEQ 01  
82 "\*PSN"  
83 XEQ 01  
84 "TAYSS"

```

85 XEQ 01
86 "TT"
87 XEQ 01
88 "TKA"
89 XEQ 01
90 "TWA"
91 XEQ 01
92 "UR"
93 XEQ 01
94 "WN"
95 XEQ 01
96 2
97 ST- 35
98 "A"
99 XEQ 01
100 7
101 ST- 35
102 "FH/A"
103 XEQ 01
104 "LC"
105 XEQ 01
106 7
107 ST- 35
108 "INF"
109 PROMPT
110 STO 35
111 "DA"
112 PCLPS
113 LBL 01
114 "F?"
115 PROMPT
116 STO IND
35
117 1
118 ST- 35
119 RTN
120 .END.

01 LBL "UAF
    D"
02 189
03 PSIZE
04 "L1"
05 GETSUB
06 XEQ "R"
07 1.162
08 XEQ "15"
09 -.596
10 XEQ "15"
11 .803
12 XEQ "15"
13 .65339
14 XEQ "15"
15 "WA"
16 XEQ "16"

```

LABEL INPUT REQUESTS

INPUT DATA FOR FIRST PRODUCTION  
SUBPROGRAM

SET AVAILABLE STORAGE REGISTERS  
RECALL REQUIRED WORKING LABELS

STORE DATA

17 "WT/C"  
 18 XEQ "16"  
 19 RCL 68  
 20 XEQ "18"  
 21 "KFD"  
 22 XEQ "16"  
 23 1.111  
 24 XEQ "15"  
 25 .777  
 26 XEQ "15"  
 27 1.9499  
 28 XEQ "15"  
 29 "FWA"  
 30 XEQ "16"  
 31 RCL 88  
 32 XEQ "18"  
 33 .479  
 34 XEQ "15"  
 35 .563  
 36 XEQ "15"  
 37 318.51  
 38 XEQ "15"  
 39 "TA"  
 40 XEQ "16"  
 41 "T"  
 42 XEQ "16"  
 43 1.083  
 44 XEQ "15"  
 45 10.616  
 46 XEQ "15"  
 47 "NWA"  
 48 XEQ "16"  
 49 1.058  
 50 XEQ "15"  
 51 5.8247 E  
 -05  
 52 XEQ "15"  
 53 RCL 57  
 54 XEQ "18"  
 55 .489  
 56 XEQ "15"  
 57 .736  
 58 XEQ "15"  
 59 4.046  
 60 XEQ "15"  
 61 1.486 E-  
 05  
 62 XEQ "15"  
 63 RCL 70  
 64 XEQ "18"  
 65 RCL 87  
 66 XEQ "18"  
 67 "TPS"  
 68 XEQ "16"

```

69 .319
70 XEQ "15"
71 .649
72 XEQ "15"
73 .94
74 XEQ "15"
75 4.0108 E
-02
76 XEQ "15"
77 1.21 E-0
6
78 XEQ "15"
79 RCL 79
80 XEQ "18"
81 RCL 81
82 XEQ "18"
83 RCL 98
84 XEQ "18"
85 "SF"
86 XEQ "16"
87 RCL 63
88 XEQ "18"
89 .292
90 XEQ "15"
91 1.336
92 XEQ "15"
93 1.1635 E
-04
94 XEQ "15"
95 RCL 63
96 XEQ "18"
97 RCL 65
98 XEQ "18"
99 .827
100 XEQ "15"
101 1.569
102 XEQ "15"
103 -1.286
104 XEQ "15"
105 1.2567 E
-05
106 XEQ "15"
107 "MT"
108 XEQ "16"
109 STO 37
110 "TPEN"
111 XEQ "16"
112 RCL 98
113 XEQ "18"
114 1.27
115 XEQ "15"
116 .227
117 XEQ "15"
118 2.2555 E

```

-04  
 119 XEQ "15"  
 120 RCL 94  
 121 XEQ "18"  
 122 RCL 81  
 123 XEQ "18"  
 124 .55  
 125 XEQ "15"  
 126 1.312  
 127 XEQ "15"  
 128 .496  
 129 XEQ "15"  
 130 -2.45  
 131 XEQ "15"  
 132 3.312 E-  
 05  
 133 XEQ "15"  
 134 RCL 58  
 135 XEQ "18"  
 136 RCL 82  
 137 XEQ "18"  
 138 "CSD"  
 139 XEQ "16"  
 140 RCL 98  
 141 XEQ "18"  
 142 1.128  
 143 XEQ "15"  
 144 2.4574 E  
 -03  
 145 XEQ "15"  
 146 RCL 72  
 147 XEQ "18"  
 148 "ANFT"  
 149 XEQ "16"  
 150 .782  
 151 XEQ "15"  
 152 .233  
 153 XEQ "15"  
 154 -2.304  
 155 XEQ "15"  
 156 2.4738 E  
 -05  
 157 XEQ "15"  
 158 RCL 84  
 159 XEQ "18"  
 160 RCL 71  
 161 XEQ "18"  
 162 RCL 98  
 163 XEQ "18"  
 164 1.027  
 165 XEQ "15"  
 166 1.3729 E  
 -02  
 167 XEQ "15"

168 RCL 73  
 169 XEQ "18"  
 170 .615  
 171 XEQ "15"  
 172 1.951 E-  
 04  
 173 XEQ "15"  
 174 RCL 93  
 175 XEQ "18"  
 176 .513  
 177 XEQ "15"  
 178 3.1535 E  
 -02  
 179 XEQ "15"  
 180 RCL 88  
 181 XEQ "18"  
 182 "UAFD"  
 183 PCLPS  
 184 .END.

CLEAR PROGRAM

01 \*LEL "UAF  
P"

EXECUTE FIRST SUBPROGRAM

02 XEQ "R"

GET WORKING LABELS

03 "L2"

04 GETSUB

05 "L3"

06 GETSUB

07 "L4"

08 GETSUB

09 "L6"

10 GETSUB

IDENTIFY AIRCRAFT TYPE

11 "FTR?"

12 PROMPT

13 ASTO Y

14 "Y"

15 ASTO X

16 X=Y?

17 SF 01

18 "ATK?"

19 PROMPT

20 ASTO Y

21 "Y"

22 ASTO X

23 X=Y?

24 XEQ "36"

25 "C/T?"

26 PROMPT

27 ASTO Y

28 "Y"

29 ASTO X

UPC

30 X=Y?

STRUCTURE

31 SF 02

WING MH

32 XEQ "7"

33 RCL IND

01

34 *	
35 STO 30	
36 XEQ "17"	
37 XEQ "9"	FUSELAGE MH
38 STO 02	
39 XEQ "9"	TAIL MH
40 STO 03	
41 XEQ "10"	NACELLE MH
42 STO 04	
43 RCL 30	
44 RCL 02	
45 RCL 03	
46 XEQ "34"	
47 STO 54	STRUCTURE MH
48 RCL 30	CONVERT TO CURRENT \$ (RATEMFG *)
49 RCL 66	
50 *	
51 STO 30	
52 RCL 02	
53 RCL 66	
54 *	
55 STO 02	
56 RCL 03	
57 RCL 66	
58 *	
59 STO 03	
60 RCL 04	
61 RCL 66	
62 *	
63 STO 04	
64 RCL 30	
65 RCL 02	
66 RCL 03	
67 XEQ "34"	
68 1 E-06	
69 *	
70 STO 20	CUR \$ M. STRUCTURE
71 XEQ "10"	RAW MATERIAL
72 STO 21	
73 XEQ "7"	CREW SYSTEM
74 STO 05	
75 XEQ "7"	FLIGHT CONTROLS
76 RCL IND	
01	
77 RCL IND	
00	
78 *	
79 XEQ "8"	
80 RCL IND	
01	
81 *	
82 XEQ "17"	
83 +	
84 STO 06	



85	XEQ	"9"	LANDING GEAR
86	STO	07	
87	XEQ	"7"	ENGINE INSTALLATION
88	STO	03	
89	XEQ	"9"	ENVIRONMENTAL CONTROL SYSTEM
90	STO	09	
91	XEQ	"11"	ELECTRICAL
92	STO	10	
93	XEQ	"10"	HYDRAULIC
94		1	
95	RCL	IND	
		01	
96		-	
97	XEQ	"17"	
98		.75	
99		*	
100		1	
101		+	
102		*	
103	STO	11	
104	XEQ	"7"	FUEL
105	STO	12	
106	XEQ	"10"	ARMAMENT
107	STO	13	
108	XEQ	"10"	CARGO HANDLING
109	STO	14	
110	STO	32	
111	RCL	05	
112	RCL	07	
113	XEQ	"35"	
114	RCL	06	
115	RCL	08	
116	RCL	09	
117	XEQ	"34"	
118	RCL	10	
119	RCL	11	
120	RCL	12	
121	XEQ	"34"	
122	RCL	13	
123		+	SUMMATION SUBSYSTEMS
124		"SUBIF?"	
125	PROMPT		INFLATION FACTOR
126		*	
127	STO	29	CUR \$ M. SUBSYSTEMS
128	RCL	21	
129		"RMIF?"	
130	PROMPT		RAW MATERIAL INFLATION FACTOR
131		*	
132	STO	21	CUR \$ M. RAW MATERIAL
133		+	
134	RCL	20	CUR \$ M. STRUCTURE
135		+	CUR \$ M. AIRFRAME
136	XEQ	"10"	
137		*	

138	STO 23	FINAL ASSEMBLY
139	"UAFP"	
140	PCLPS	CLEAR PROGRAM
141	.END.	
01	LBL "AF"	SECOND SUBPROGRAM DATA INPUT
02	"L1"	GET WORKING LABEL
03	GETSUB	
04	XEQ "P"	
05	-.492	DATA INPUT
06	XEQ "15"	
07	.8647	
08	XEQ "15"	
09	"PDR"	
10	XEQ "16"	
11	STO 16	
12	"REGR"	LABOR RATE INPUTS
13	XEQ "16"	
14	"RFLT"	
15	XEQ "16"	
16	"REN"	
17	XEQ "16"	
18	"RMGT"	
19	XEQ "16"	
20	"RMFS"	
21	XEQ "16"	
22	"RFBS"	
23	XEQ "16"	
24	"RTDE"	
25	XEQ "16"	
26	"RTFB"	
27	XEQ "16"	
28	-.171	
29	XEQ "15"	
30	.1505	
31	XEQ "15"	
32	RCL 16	
33	XEQ "18"	
34	"RQCL"	
35	XEQ "16"	
36	"AF"	
37	PCLPS	CLEAR PROGRAM
38	.END.	
01	LBL "AFP"	EXECUTE SECOND SUBPROGRAM
02	XEQ "R"	
03	"L2"	GET WORKING LABELS
04	GETSUB	
05	"L3"	
06	GETSUB	
07	"L4"	
08	GETSUB	
09	"L7"	
10	GETSUB	
11	RCL 54	

12	RCL 23	
13	1 E06	
14	*	
15	STO 23	STRMH + $\frac{\text{FINASSYS}}{\text{RATEMFG}}$
16	RCL 66	
17	/	
18	+	
19	STO 28	
20	XEQ "10"	SUSTAINING MH
21	*	
22	STO 22	
23	RCL IND	
	01	
24	.331	
25	*	
26	XEQ "17"	
27	RCL IND	
	01	
28	.021	
29	XEQ "33"	
30	RCL IND	
	01	
31	.085	
32	XEQ "33"	
33	RCL 22	
34	*	
35	STO 24	ENGINEERING CUR \$
36	RCL IND	
	01	
37	.133	
38	*	
39	XEQ "17"	
40	RCL 22	
41	*	
42	STO 25	PROGRAM MANAGEMENT CUR \$
43	RCL IND	
	01	
44	.209	
45	*	
46	XEQ "17"	
47	RCL 22	
48	*	
49	STO 26	MANUFACTURING SUPPORT CUR \$
50	RCL IND	
	01	
51	.034	
52	*	
53	XEQ "17"	
54	RCL IND	
	01	
55	.113	
56	XEQ "33"	
57	RCL IND	
	01	

58	.074	
59	XEQ "33"	
60	RCL 22	
61	*	
62	STO 27	TOOLING CUR \$
63	RCL 26	
64	RCL 25	
65	RCL 24	
66	XEQ "34"	
67	STO 22	CUR \$ SUSTAINING
68	XEQ 55	ADVANCED MATERIAL FACTOR
69	RCL 20	
70	1 E06	
71	*	
72	*	
73	STO 20	CUR \$ STRUCTURE
74	XEQ 56	ADVANCED MATERIAL FACTOR
75	RCL 22	
76	*	
77	STO 22	CUR \$ SUSTAINING
78	XEQ 57	ADVANCED MATERIAL FACTOR
79	RCL 21	
80	1 E06	
81	*	
82	*	
83	STO 21	CUR \$ RAW MATERIALS
84	"\$APU?"	
85	PROMPT	
86	STO 15	INPUT APU COSTS
87	STO 33	
88	XEQ "10"	QUALITY CONTROL MH
89	RCL 28	
90	*	
91	STO 25	
92	RCL IND	
	01	
93	*	
94	XEQ "17"	
95	STO 25	CUR \$ QUALITY CONTROL
96	RCL 20	
97	RCL 21	
98	RCL 22	
99	XEQ "35"	
100	STO 53	UPC AIRFRAME
101	+	
102	RCL 23	
103	RCL 29	
104	1 E06	
105	*	
106	XEQ "35"	
107	STO 02	
108	RCL 53	
109	100	
110	"LR AF?"	

111	PROMPT	
112	LN	
113	2	
114	LN	
115	/	
116	Y↑X	
117	/	
118	STO 53	1ST AIRFRAME UPC
119	RCL 02	
120	RCL 23	
121	RCL 29	
122	1 E06	
123	*	
124	XEQ "35"	
125	STO 24	
126	"AFP"	CLEAR PROGRAM
127	PCLPS	
128♦	LBL 55	WORKING LABELS FOR SUBPROGRAM
129	1	
130	RCL 40	
131	XEQ 58	
132	RTN	
133♦	LBL 56	
134	1	
135	RCL 41	
136	XEQ 58	
137	RTN	
138♦	LBL 57	
139	1	
140	RCL 42	
141	XEQ 58	
142	RTN	
143♦	LBL 58	
144	X=0?	
145	RDN	
146	RTN	
147	.END.	
01♦	LBL "URV"	EXECUTE THIRD SUBPROGRAM
	"	
02	"L1"	GET WORKING LABELS
03	GETSUB	
04	"L3"	
05	GETSUB	
06	100	
07	STO 01	
08	"ENTWR"	INPUT DATA
09	XEQ "16"	
10	"TIT"	
11	XEQ "16"	
12	"MQT"	

13 XEQ "16"  
14 "EPR"  
15 XEQ "16"  
16 "SLM"  
17 XEQ "16"

18 100  
19 STO 01  
20 RCL 89  
21 .9

FIGHTER AVIONICS UPC

22 Y↑X  
23 RCL 96  
24 1.09  
25 Y↑X

26 \*  
27 9.3797  
28 \*  
29 "AVIF?"  
30 PROMPT  
31 STO 35

32 \*  
33 150  
34 "AVLR?"  
35 PROMPT

36 STO 49  
37 XEQ 58  
38 STO 48  
39 RCL 89

1ST UNIT FIGHTER AVIONICS UPC

40 .97  
41 Y↑X  
42 RCL 96  
43 \*

44 11.34  
45 \*  
46 RCL 35  
47 \*

48 150  
49 RCL 49  
50 XEQ 58  
51 STO 51

1ST UNIT ATTACK AVIONICS UPC

52 RCL 89  
53 2.34  
54 Y↑X  
55 RCL 96

56 1.35  
57 Y↑X  
58 \*  
59 1.3449 E  
-03

60 \*  
61 RCL 35  
62 \*  
63 150  
64 RCL 49  
65 XEQ 58

66	STO 50	1ST UNIT CARGO AVIONICS UPC
67	RCL IND	
	01	
68	LN	
69	8.86	
70	*	
71	XEQ "17"	
72	RCL IND	
	01	
73	LN	
74	34.56	
75	*	
76	XEQ "17"	
77	+	
78	RCL IND	
	01	
79	XEQ "17"	
80	-	
81	218.7	
82	-	
83	STO 38	DELTA TECHNOLOGY TIME
84	RCL IND	
	01	
85	STO 02	
86	.7	
87	*	
88	XEQ "17"	
89	RCL IND	
	01	
90	X↑2	
91	*	
92	1	
93	-	
94	RCL 02	
95	+	
96	2116	
97	*	PRESS
98	.647	
99	Y↑X	
100	XEQ "17"	
101	STO 02	
102	RCL 37	
103	.473	
104	Y↑X	
105	1.06	
106	RCL 38	
107	Y↑X	
108	*	
109	RCL 02	
110	*	
111	5.7363	
112	*	ENGINE \$ M.
113	1000	
114	"ENLR"	

115	PROMPT	
116	XEQ 58	
117	STO 49	1ST ENGINE \$ M.
118	"UAV"	
119	PCLPS	CLEAR PROGRAM
120	LBL 58	SUBPROGRAM WORKING LABELS
121	LN	
122	2	
123	LN	
124	/	
125	Y↑X	
126	/	
127	RTN	
128	.END.	
01	LBL "RDD"	RDT&E DATA INPUT
02	XEQ "R"	
03	"L1"	GET WORKING LABEL
04	GETSUB	
05	RCL 57	INPUT DATA
06	XEQ "18"	
07	RCL 67	
08	XEQ "18"	
09	RCL 68	
10	XEQ "18"	
11	RCL 81	
12	XEQ "18"	
13	RCL 62	
14	XEQ "18"	
15	1.259	
16	XEQ "15"	
17	.127	
18	XEQ "15"	
19	1.722	
20	XEQ "15"	
21	.399	
22	XEQ "15"	
23	4.756	
24	XEQ "15"	
25	1.214	
26	XEQ "15"	
27	.322	
28	XEQ "15"	
29	1.22	
30	XEQ "15"	
31	.345	
32	XEQ "15"	
33	7.604	
34	XEQ "15"	
35	1.288	
36	XEQ "15"	
37	.483	



```

38 XEQ "15"
39 1.709
40 XEQ "15"
41 .516
42 XEQ "15"
43 24.265
44 XEQ "15"
45 .134
46 XEQ "15"
47 1.062
48 XEQ "15"
49 .416
50 XEQ "15"
51 .836
52 XEQ "15"
53 91.669
54 XEQ "15"
55 .085
56 XEQ "15"
57 .89
58 XEQ "15"
59 .448
60 XEQ "15"
61 .8
62 XEQ "15"
63 672.54
64 XEQ "15"
65 "DT"
66 XEQ "16"
67 "EPR"
68 XEQ "16"
69 "EAF"
70 XEQ "16"
71 "SLM"
72 XEQ "16"
73 1.124
74 XEQ "15"
75 .341
76 XEQ "15"
77 .274
78 XEQ "15"
79 1.554
80 XEQ "15"
81 4.492
82 XEQ "15"
83 "RDD"
84 PCLPS
85 .END.
01♦LBL "RDP"
"
02 170
03 PSIZE
04 XEQ "R"
05 "L2"

```

CLEAR PROGRAM

RDT&E EXECUTE FIRST SUBPROGRAM

SET STORAGE REGISTER SIZE

GET WORKING LABELS

06	GETSUB	
07	"L3"	
08	GETSUB	
09	"L8"	
10	GETSUB	
11	XEQ "11"	
12	STO 02	TOTAL ENGINEERING LABOR MH
13	4	
14	ST- 01	
15	XEQ "11"	
16	STO 03	TOTAL TOOLING LABOR MH
17	4	
18	ST- 01	
19	XEQ "11"	
20	"AFIF?"	
21	PROMPT	
22	STO 35	AIRFRAME INFLATION FACTOR
23	*	
24	STO 04	CUR \$ TOTAL OTHER DIRECT CHARGES
25	3	
26	ST- 01	
27	XEQ "11"	
28	RCL 35	
29	*	
30	STO 05	CUR \$ 1ST AIRFRAME MANUFACTURING MATERIAL
31	4	
32	ST- 01	
33	XEQ "11"	
34	RCL 35	
35	*	
36	STO 06	CUR \$ FIRST AIRFRAME LABOR
37	1	
38	RCL 42	ADVANCED MATERIAL FACTOR
39	X=0?	
40	RDN	
41	RCL 05	
42	*	
43	STO 05	
44	1	
45	RCL 40	
46	X=0?	
47	RDN	
48	RCL 06	
49	*	
50	STO 06	
51	"RENGR?"	
52	PROMPT	
53	RCL 02	
54	*	
55	STO 02	CUR \$ ENGINEERING LABOR
56	"RTDE?"	
57	PROMPT	
58	"RTFB?"	
59	PROMPT	

60	+	
61	2	
62	/	
63	RCL	03
64	*	
65	STO	03
66	0	
67	STO	21
68	STO	11
69	RCL	05
70	RCL	06
71	+	
72	STO	19
73	"RED LR	
	AF?"	
74	PROMPT	
75	STO	05
76	2	
77	/	
78	STO	06
79	FS?	01
80	GTO	00
81	5	
82	STO	10
83	♦LBL	06
84	RCL	67
85	X>Y?	
86	XEQ	01
87	♦LBL	02
88	RCL	19
89	RCL	10
90	RCL	06
91	LN	
92	2	
93	LN	
94	/	
95	Y↑X	
96	*	
97	ST+	21
98	1	
99	ST-	10
100	DSE	10
101	GTO	02
102	RCL	11
103	X=0?	
104	GTO	04
105	SF	07
106	♦LBL	03
107	FS?	07
108	XEQ	05
109	RCL	12

CUR \$ TOOLING LABOR

FIRST AIRFRAME

RDT&E AIRFRAME LOOP

110 RCL 11  
111 RCL 05  
112 LN  
113 2  
114 LN  
115 /  
116 Y↑X  
117 \*  
118 ST+ 21  
119 FS? 07  
120 STO -12  
121 1  
122 ST- 11  
123 CF 07  
124 DSE 11  
125 GT0 03

126♦LBL 04  
127 RCL 21  
128 STO 19  
129 RCL 04  
130 +  
131 RCL 02  
132 RCL 03  
133 +  
134 +

CUR \$ TOTAL RDT&E AIRFRAME

135 STO 36  
136 FS? 01  
137 RCL 48  
138 FS? 03  
139 RCL 51  
140 FS? 02  
141 RCL 50  
142 STO 50  
143 1 E-06  
144 \*

RECALL AVIONICS UPC

145 STO 10  
146 "INS?"  
147 PROMPT  
148 ASTO Y  
149 "N"  
150 ASTO X  
151 X=Y?  
152 GT0 20  
153 RCL 10  
154 .255  
155 Y↑X  
156 RCL 59  
157 .232  
158 Y↑X  
159 \*  
160 2.718  
161 \*  
162 GT0 21

ADJUST FOR INS AND ECM

163♦LBL 20  
164 RCL 10  
165 1.67  
166 \*

167♦LBL 21  
168 .387  
169 Y↑X  
170 RCL 67  
171 .731  
172 Y↑X-  
173 \*  
174 6.53  
175 \*  
176 STO 11  
177 RCL 77  
178 1  
179 X=Y?  
180 XEQ "32"

181♦LBL "HI"  
182 RCL 11  
183 STO 12

184♦LBL "IH"  
185 RCL 11  
186 RCL 12  
187 +  
188 1 E06

189 \*  
190 STO 39  
191 XEQ "11"  
192 1.111  
193 RCL 38  
194 Y↑X

RDT&E AVIONICS

195 \*  
196 STO 13  
197 .9  
198 LN  
199 2

FIRST HALF OF ENGINE COSTS

200 LN  
201 /  
202 STO 31  
203 RCL 67  
204 RCL 75  
205 \*  
206 STO 17  
207 "SPFAC?"  
208 PROMPT  
209 \*  
210 STO 16  
211 0  
212 STO 21  
213 "RED LR

EN?"  
214 PROMPT  
215 LN  
216 2  
217 LN  
218 /  
219 STO 02

220♦LBL 10  
221 RCL 49  
222 1 E-06  
223 \*  
224 RCL 17  
225 RCL 02  
226 Y↑X  
227 \*  
228 ST+ 21  
229 DSE 17  
230 GTO 10  
231 RCL 21  
232 RCL 67  
233 RCL 75  
234 \*  
235 /  
236 RCL 16  
237 \*  
238 1.5  
239 \*

SECOND HALF OF ENGINE FORMULA

240 STO 17  
241 RCL 13  
242 +  
243 "ENIF?"  
244 PROMPT  
245 \*  
246 1 E06  
247 \*  
248 STO 37  
249 "RDP"  
250 PCLPS

CUR \$ RDT&E ENGINES

CLEAR PROGRAM

251♦LBL 01  
252 RCL 67  
253 RCL 10  
254 -  
255 STO 11  
256 GTO 02

WORKING LABELS SUBPROGRAM

257♦LBL 00  
258 12  
259 STO 10  
260 GTO 06

261♦LBL 05  
262 RCL 19

263 STO 12  
264 RTN  
265 .END.

01 LBL "OUT"

RDTE AND PRODUCTION OUTPUT PROGRAM

02 RCL 52

03 RCL 67

04 -

# OF PRODUCTION AIRCRAFT

05 STO 15

06 "L3"

GET WORKING LABELS

07 GETSUB

08 "L4"

09 GETSUB

10 "T"

11 GETSUB

12 RCL 36

13 .1

14 \*

INTEGRATED LOGISTICS SUPPORT

15 ST+ 36

16 RCL 36

17 "AFM"

AIRFRAME RDTE

18 XEQ "O"

19 RCL 39

20 "AV"

AVIONICS RDTE

21 XEQ "O"

22 RCL 37

23 "EN"

ENGINE RDTE

24 XEQ "O"

25 XEQ "35"

26 RCL 36

27 "%GEA?"

28 PROMPT

29 STO 05

30 \*

GENERAL AND ADMINISTRATIVE RDTE

31 PRX

32 STO 06

33 +

34 RCL 05

35 1

36 +

37 RCL 06

38 \*

39 "%PR?"

40 PROMPT

41 STO 07

42 \*

43 RCL 05

44 /

PROFIT RDTE

45 PRX

46 +

47 "RED"

TOTAL RDTE

48 XEQ "O"

49 RCL 33

50 RCL 29  
 51 1 E06  
 52 \*  
 53 +  
 54 100  
 55 "LR SUB"  
 56 XEQ 56  
 57 STO 31  
 58 Y↑X  
 59 /  
 60 STO -18  
 61 XEQ "T"  
 62 STO 02  
 63 "SUB PRD"

64 XEQ "O" SUBSYSTEM PRODUCTION

65 RCL 53  
 66 STO 18  
 67 "LR AF"  
 68 XEQ 56  
 69 STO 31  
 70 XEQ "T"  
 71 STO 03  
 72 "AF PRD"

AIRFRAME PRODUCTION

73 XEQ "O"  
 74 RCL 50  
 75 STO 18  
 76 "LR AV"  
 77 XEQ 56  
 78 STO 31  
 79 XEQ "T"  
 80 STO 04  
 81 "AV PRD"

AVIONICS PRODUCTION

82 XEQ "O"  
 83 RCL 49  
 84 STO 18  
 85 RCL 15  
 86 4  
 87 \*  
 88 STO 15  
 89 "LR EN"  
 90 XEQ 56  
 91 STO 31  
 92 XEQ "T"  
 93 STO 08  
 94 "EN PRD"

ENGINE PRODUCTION

95 XEQ "O"  
 96 RCL 02  
 97 RCL 03  
 98 RCL 04  
 99 RCL 08  
 100 XEQ "34"  
 101 RCL 02  
 102 RCL 03



103 +	
104 RCL 04	
105 2	
106 /	
107 +	
108 RCL 05	
109 *	
110 STO 06	
111 "GER"	
112 XEQ "0"	GENERAL AND ADMINISTRATIVE PRODUCTION
113 + -	
114 RCL 05	
115 1	
116 +	
117 RCL 06	
118 *	
119 RCL 07	
120 *	
121 RCL 05	
122 /	
123 "PROF"	
124 XEQ "0"	PROFIT PRODUCTION
125 +	
126 "TOT PRD"	
127 XEQ "0"	TOTAL PRODUCTION
128 "OUT"	
129 PCLPS	CLEAR PROGRAM
130 LBL 56	WORKING LABELS SUBPROGRAM
131 "I?"	
132 PROMPT	
133 LN	
134 2	
135 LN	
136 /	
137 RTN	
138 .END.	
01 LBL "ISD"	INITIAL SUPPORT
	INPUT DATA FIRST SUBPROGRAM IS
02 190	
03 PSIZE	SET STORAGE REGISTER SIZE
04 XEQ "R"	
05 "L1"	GET WORKING LABELS
06 GETSUB	
07 2.083	INPUT DATA
08 XEQ "15"	
09 .704	
10 XEQ "15"	
11 -2.489	
12 XEQ "15"	
13 2.906 E-	
03	

```

14 XEQ "15"
15 RCL 57
16 XEQ "18"
17 "B"
18 XEQ "16"
19 STO 40
20 RCL 98
21 XEQ "18"
22 .691
23 XEQ "15"
24 .923
25 XEQ "15"
26 1.068 E0
    3
27 XEQ "15"
28 RCL 57
29 XEQ "18"
30 RCL 81
31 XEQ "18"
32 1.896
33 XEQ "15"
34 1.92
35 XEQ "15"
36 1.095 E-
    04
37 XEQ "15"
38 RCL 57
39 XEQ "18"
40 RCL 81
41 XEQ "18"
42 1.156
43 XEQ "15"
44 .286
45 XEQ "15"
46 .195
47 XEQ "15"
48 RCL 87
49 XEQ "18"
50 RCL 70
51 XEQ "18"
52 .639
53 XEQ "15"
54 1.829
55 XEQ "15"
56 1.364
57 XEQ "15"
58 -1.29
59 XEQ "15"
60 1.205 E-
    06
61 XEQ "15"
62 RCL 87
63 XEQ "18"
64 RCL 88

```

65 XEQ "18"  
66 RCL 59  
67 XEQ "18"  
68 RCL 98  
69 XEQ "18"  
70 1.196  
71 XEQ "15"  
72 2.684  
73 XEQ "15"  
74 289.89  
75 XEQ "15"  
76 RCL 70  
77 XEQ "18"  
78 RCL 81  
79 XEQ "18"  
80 1.294  
81 XEQ "15"  
82 .723  
83 XEQ "15"  
84 .53  
85 XEQ "15"  
86 RCL 69  
87 XEQ "18"  
88 RCL 63  
89 XEQ "18"  
90 .39  
91 XEQ "15"  
92 2.28  
93 XEQ "15"  
94 2.296  
95 XEQ "15"  
96 76.73  
97 XEQ "15"  
98 RCL 69  
99 XEQ "18"  
100 RCL 65  
101 XEQ "18"  
102 RCL 98  
103 XEQ "18"  
104 .667  
105 XEQ "15"  
106 1.112  
107 XEQ "15"  
108 -2.602  
109 XEQ "15"  
110 5.399  
111 XEQ "15"  
112 RCL 69  
113 XEQ "18"  
114 RCL 64  
115 XEQ "18"  
116 RCL 98  
117 XEQ "18"  
118 1.868

119 XEQ "15"  
 120 .299  
 121 XEQ "15"  
 122 .506  
 123 XEQ "15"  
 124 RCL 82  
 125 XEQ "18"  
 126 RCL 79  
 127 XEQ "18"  
 128 .692  
 129 XEQ "15"  
 130 .619  
 131 XEQ "15"  
 132 -2.159  
 133 XEQ "15"  
 134 1.227 E0  
           4  
 135 XEQ "15"  
 136 RCL 79  
 137 XEQ "18"  
 138 RCL 81  
 139 XEQ "18"  
 140 RCL 98  
 141 XEQ "18"  
 142 .92  
 143 XEQ "15"  
 144 1.6  
 145 XEQ "15"  
 146 73.374  
 147 XEQ "15"  
 148 RCL 79  
 149 XEQ "18"  
 150 RCL 81  
 151 XEQ "18"  
 152 -.654  
 153 XEQ "15"  
 154 .982  
 155 XEQ "15"  
 156 6.966  
 157 XEQ "15"  
 158 2.402 E-  
           02  
 159 XEQ "15"  
 160 RCL 80  
 161 XEQ "18"  
 162 RCL 49  
 163 .4966  
 164 \*  
 165 XEQ "18"  
 166 RCL 98  
 167 XEQ "18"  
 168 RCL 75  
 169 XEQ "18"  
 170 1.834

171	XEQ "15"	
172	4.779	
173	XEQ "15"	
174	-8.759	
175	XEQ "15"	
176	621.79	
177	XEQ "15"	
178	RCL 75	
179	XEQ "18"	
180	RCL 78	
181	1	
182	+	
183	XEQ "18"	
184	RCL 98	
185	XEQ "18"	
186	"ISD"	CLEAR PROGRAM
187	PCLPS	
188	.END.	
01	◆LBL "ISF"	EXECUTE FIRST SUBPROGRAM
02	XEQ "R"	
03	"L2"	GET WORKING LABELS
04	GETSUB	
05	"L3"	
06	GETSUB	
07	"26"	
08	GETSUB	
09	FS? 02	SELECT SQUADRON MULTIPLES BY
10	XEQ 51	TYPE AIRCRAFT
11	XEQ 52	
12	◆LBL 53	STRUCTURE
13	XEQ "7"	INITIAL AND PIPELINE SPARES
14	RCL 52	
15	STO 30	
16	*	
17	STO 15	I&PS STORE
18	XEQ "9"	BASE LEVEL SUPPORT EQUIPMENT
19	STO 08	
20	XEQ "26"	
21	ST+ 15	BLS STORE
22	XEQ "9"	DATA
23	XEQ "54"	
24	ST+ 15	D STORE
25	XEQ "9"	CREW
26	XEQ "55"	
27	STO 17	I&PS
28	XEQ "11"	
29	STO 08	
30	XEQ "26"	
31	ST+ 17	BLS
32	XEQ "9"	
33	XEQ "54"	
34	ST+ 17	D

35 XEQ "9"	LANDING GEAR
36 XEQ "55"	
37 STO 19	I&PS
38 XEQ "7"	
39 STO 08	
40 XEQ "26"	
41 ST+ 19	BLS
42 XEQ "7"	
43 XEQ "54"	
44 ST+ 19	D
45 XEQ "9"	FLIGHT CONTROLS
46 XEQ "55"	
47 STO 21	I&PS
48 XEQ "7"	
49 STO 08	
50 XEQ "26"	
51 ST+ 21	BLS
52 XEQ "9"	
53 XEQ "54"	
54 ST+ 21	D
55 XEQ "7"	ENGINE INSTALLATION
56 RCL IND	
01	
57 *	
58 XEQ "55"	
59 STO 23	I&PS
60 XEQ "17"	
61 XEQ "7"	
62 XEQ "54"	
63 ST+ 23	D
64 "ISP"	
65 PCLPS	CLEAR PROGRAM
66♦LBL 51	WORKING LABELS SUBPROGRAM
67 1.587	
68 STO 02	
69 2.158	
70 STO 03	
71 GTO 53	
72♦LBL 52	
73 1.263	
74 STO 02	
75 1.527	
76 STO 03	
77 RTN	
78 .END.	
01♦LBL "Y"	SECOND SUBPROGRAM DATA
02 XEQ "R"	
03 "L1"	GET WORKING LABELS
04 GETSUB	
05 .106	INPUT DATA
06 XEQ "15"	
07 3.932	

```

08 XEQ "15"
09 6.249 E-
      06
10 XEQ "15"
11 RCL 94
12 XEQ "18"
13 RCL 82
14 XEQ "18"
15 .311
16 XEQ "15"
17 1.136
18 XEQ "15"
19 2.96 E04
20 XEQ "15"
21 RCL 94
22 XEQ "18"
23 RCL 81
24 XEQ "18"
25 2.482
26 XEQ "15"
27 1.086
28 XEQ "15"
29 -5.365
30 XEQ "15"
31 2.687 E-
      04
32 XEQ "15"
33 RCL 82
34 XEQ "18"
35 RCL 60
36 XEQ "18"
37 RCL 98
38 XEQ "18"
39 .2
40 XEQ "15"
41 2.251
42 XEQ "15"
43 7.863 E-
      02
44 XEQ "15"
45 RCL 58
46 XEQ "18"
47 RCL 82
48 XEQ "18"
49 .102
50 XEQ "15"
51 .639
52 XEQ "15"
53 4.081 E0
      5
54 XEQ "15"
55 RCL 58
56 XEQ "18"
57 RCL 81

```

58 XEQ "18"  
59 .805  
60 XEQ "15"  
61 1.24  
62 XEQ "15"  
63 -3.758  
64 XEQ "15"  
65 2.528  
66 XEQ "15"  
67 RCL 58  
68 XEQ "18"  
69 RCL 60  
70 XEQ "18"  
71 RCL 98  
72 XEQ "18"  
73 .892  
74 XEQ "15"  
75 1.432  
76 XEQ "15"  
77 3.566  
78 XEQ "15"  
79 .173  
80 XEQ "15"  
81 RCL 82  
82 XEQ "18"  
83 RCL 72  
84 XEQ "18"  
85 RCL 98  
86 XEQ "18"  
87 1.088  
88 XEQ "15"  
89 .7  
90 XEQ "15"  
91 .107  
92 XEQ "15"  
93 21.654  
94 XEQ "15"  
95 RCL 64  
96 XEQ "18"  
97 RCL 72  
98 XEQ "18"  
99 RCL 82  
100 XEQ "18"  
101 .723  
102 XEQ "15"  
103 1.106  
104 XEQ "15"  
105 1.327  
106 XEQ "15"  
107 .378  
108 XEQ "15"  
109 RCL 82  
110 XEQ "18"  
111 RCL 72



```

112 XEQ "18"
113 RCL 81
114 XEQ "18"
115 .172
116 XEQ "15"
117 1.463
118 XEQ "15"
119 7.615 E-
      05
120 XEQ "15"
121 RCL 71
122 XEQ "18"
123 RCL 84
124 XEQ "18"
125 .962
126 XEQ "15"
127 -5.54
128 XEQ "15"
129 2.057
130 XEQ "15"
131 RCL 87
132 XEQ "18"
133 RCL 98
134 XEQ "18"
135 .743
136 XEQ "15"
137 .853
138 XEQ "15"
139 2.872 E0
      4
140 XEQ "15"
141 RCL 75
142 XEQ "18"
143 RCL 98
144 XEQ "18"
145 1.502
146 XEQ "15"
147 1.279
148 XEQ "15"
149 .796
150 XEQ "15"
151 RCL 73
152 XEQ "18"
153 RCL 82
154 XEQ "18"
155 2.411
156 XEQ "15"
157 1.182
158 XEQ "15"
159 9.511 E-
      08
160 XEQ "15"
161 RCL 62
162 XEQ "18"

```

163 RCL 73	
164 XEQ "18"	
165 1.432	
166 XEQ "15"	
167 .305	
168 XEQ "15"	
169 9.464 E-	
05	
170 XEQ "15"	
171 RCL 62	
172 XEQ "18"	
173 RCL 73	
174 XEQ "18"	
175 "Y"	CLEAR PROGRAM
176 PCLPS	
177 .END.	
01 LBL "YP"	EXECUTE SECOND SUBPROGRAM
02 XEQ "R"	
03 "L2"	GET WORKING LABELS
04 GETSUB	
05 "26"	
06 GETSUB	
07 XEQ "9"	ENVIRONMENTAL CONTROL SYSTEM
08 XEQ 55	
09 STO 25	I&PS
10 XEQ "9"	
11 STO 08	
12 XEQ "26"	
13 ST+ 25	BLS
14 XEQ "7"	
15 XEQ 54	
16 ST+ 25	D
17 XEQ "9"	ELECTRICAL
18 XEQ 55	
19 STO 26	I&PS
20 XEQ "9"	
21 STO 08	
22 XEQ "26"	
23 ST+ 26	BLS
24 XEQ "7"	
25 XEQ 54	
26 ST+ 26	D
27 XEQ "7"	HYDRAULIC
28 XEQ 55	
29 STO 27	I&PS
30 XEQ "7"	
31 STO 08	
32 XEQ "26"	
33 ST+ 27	BLS
34 XEQ "7"	
35 XEQ 54	
36 ST+ 27	D
37 XEQ "9"	FUEL
38 XEQ 55	

39	STO 29	I&PS
40	XEQ "9"	
41	XEQ 54	
42	ST+ 29	D
43	XEQ "9"	
44	STO 08	
45	XEQ "26"	
46	ST+ 29	BLS
47	XEQ "9"	ARMAMENT
48	XEQ 55	
49	STO 31	I&PS
50	XEQ "9"	
51	STO 08	
52	XEQ "26"	
53	ST+ 31	BLS
54	XEQ "9"	
55	XEQ 54	
56	ST+ 31	D
57	RCL 32	CARGO HANDLING
58	1 E06	
59	*	
60	STO 45	RECALL UPC
61	.025	
62	*	
63	XEQ "55"	
64	STO 32	I&PS
65	RCL 45	
66	.02	
67	*	
68	STO 08	
69	XEQ "26"	
70	ST+ 32	BLS
71	RCL 45	
72	.01	
73	*	
74	XEQ "54"	
75	ST+ 32	D
76	RCL 33	APU
77	STO 45	
78	.06	
79	*	
80	XEQ "55"	
81	STO 33	I&PS
82	RCL 45	
83	.01	
84	*	
85	STO 08	
86	XEQ "26"	
87	ST+ 33	BLS
88	RCL 45	
89	.01	
90	*	
91	XEQ "54"	
92	ST+ 33	D

93 "YP"	
94 PCLPS	CLEAR PROGRAM
95♦LBL 54	WORKING LABELS SUBPROGRAM
96 1000	
97 *	
98 RTN	
99♦LBL 55	
100 RCL 30	
101 *	
102 RTN	
103 .END.	
01♦LBL "RV"	THIRD SUBPROGRAM DATA
02 XEQ "R"	
03 "L1"	GET WORKING LABEL
04 GETSUB	
05 2	INPUT DATA
06 XEQ "15"	
07 2	
08 XEQ "15"	
09 -.86	
10 XEQ "15"	
11 56.414	
12 XEQ "15"	
13 RCL 96	
14 XEQ "18"	
15 RCL 97	
16 XEQ "18"	
17 RCL 98	
18 XEQ "18"	
19 1.491	
20 XEQ "15"	
21 .87	
22 XEQ "15"	
23 1.509	
24 XEQ "15"	
25 1.044 E-	
03	
26 XEQ "15"	
27 RCL 96	
28 XEQ "18"	
29 "#DAYS"	
30 XEQ "16"	
31 RCL 64	
32 XEQ "18"	
33 2.06	
34 XEQ "15"	
35 -2.353	
36 XEQ "15"	
37 1.538 E-	
03	
38 XEQ "15"	
39 RCL 96	

```

40 XEQ "18"
41 RCL 98
42 XEQ "18"
43 .755
44 XEQ "15"
45 -.429
46 XEQ "15"
47 .384
48 XEQ "15"
49 5.278 E0
50 XEQ "15"
51 "ENTWR"
52 XEQ "16"
53 RCL 95
54 XEQ "18"
55 RCL 90
56 XEQ "18"
57 1.477
58 XEQ "15"
59 5.619
60 XEQ "15"
61 -.8217
62 XEQ "15"
63 2.268 E-
64 XEQ "15"
65 RCL 81
66 XEQ "18"
67 "TIT"
68 XEQ "16"
69 RCL 98
70 XEQ "18"
71 2.002
72 XEQ "15"
73 3.425
74 XEQ "15"
75 2.034 E-
76 XEQ "15"
77 RCL 63
78 XEQ "18"
79 RCL 88
80 XEQ "18"
81 "AV"
82 PCLPS
83 .END.
01+LBL "AVP"
02 180
03 PSIZE
04 XEQ "R"
05 "L2"
06 GETSUB

```

CLEAR PROGRAM

EXECUTE THIRD SUBPROGRAM

SET STORAGE REGISTER SIZE

GET WORKING LABELS

07	"26"	
08	GETSUB	
09	"L4"	
10	GETSUB	
11	XEQ "12"	AVIONICS
12	XEQ "12"	
13	+	
14	.586	
15	Y↑X	
16	XEQ "13"	
17	XEQ "14"	
18	XEQ 55	
19	STO 46	I&PS
20	XEQ "7"	
21	STO 08	
22	XEQ "26"	
23	ST+ 46	BLS
24	XEQ "9"	
25	XEQ 54	
26	ST+ 46	D
27	RCL 30	ENGINE
28	RCL 75	
29	*	# OF PRODUCTION AIRCRAFT ENGINES
30	RCL 49	
31	.4966	
32	*	FIRST ENGINE COST
33	.25	
34	*	
35	*	
36	STO 45	I&PS
37	XEQ "7"	
38	RCL 75	
39	*	
40	STO 08	
41	XEQ "26"	
42	ST+ 45	BLS
43	XEQ "7"	
44	XEQ 54	
45	ST+ 45	D
46	XEQ "9"	INITIAL TRAINING
47	RCL 97	
48	1000	
49	/	
50	1.712	
51	Y↑X	
52	*	
53	XEQ 54	
54	FS? 01	
55	GTO d	
56	2.5	CARGO MULTIPLE
57	*	
58	•LBL d	
59	STO 35	IT

60 FS? 02	IF CARGO SKIP
61 GTO e	
62♦LBL "SSE"	SPECIAL SUPPORT EQUIPMENT
63 RCL 82	
64 1.349	
65 Y↑X	
66 998.18	
67 *	
68 RCL 52	
69 RCL 67	
70 -	
71 "A/S"	
72 PROMPT	
73 /	
74 *	
75 STO 36	SSE
76♦LBL e	
77 FS? 01	ZERO UNUSED REGISTERS BY AIRCRAFT TYPE
78 XEQ 56	
79 FS? 02	
80 XEQ 57	
81 "IS"	INITIAL SUPPORT OUTPUT
82 PRA	
83 "STR"	
84 RCL 15	
85 XEQ "O"	STRUCTURE
86 "CR"	
87 RCL 17	
88 ST+ 15	
89 XEQ "O"	CREW
90 "LG"	
91 RCL 19	
92 ST+ 15	
93 XEQ "O"	LANDING GEAR
94 "FC"	
95 RCL 21	
96 ST+ 15	
97 XEQ "O"	FLIGHT CONTROLS
98 "EI"	
99 RCL 23	
100 ST+ 15	
101 XEQ "O"	ENGINE INSTALLATION
102 "ECS"	
103 RCL 25	
104 ST+ 15	
105 XEQ "O"	ENVIRONMENTAL CONTROL SYSTEM
106 "EL"	
107 RCL 26	
108 ST+ 15	
109 XEQ "O"	ELECTRICAL
110 "HYD"	

111 RCL 27	
112 ST+ 15	
113 XEQ "0"	HYDRAULIC
114 "FUEL"	
115 RCL 29	
116 ST+ 15	
117 XEQ "0"	FUEL
118 "CH"	
119 RCL 32	
120 ST+ 15	
121 XEQ "0"	CARGO HANDLING
122 "ARM"	
123 RCL 31	
124 ST+ 15	
125 XEQ "0"	ARMAMENT
126 "APU"	
127 RCL 33	
128 ST+ 15	
129 XEQ "0"	APU
130 "%GSA?"	
131 PROMPT	
132 STO 02	
133 RCL 15	
134 RCL 46	
135 +	
136 *	
137 STO 03	
138 ST+ 15	
139 "GSA"	
140 XEQ "0"	GENERAL AND ADMINISTRATIVE
141 RCL 02	
142 1	
143 +	
144 RCL 03	
145 *	
146 "%PROF?"	
147 PROMPT	
148 *	
149 RCL 02	
150 /	
151 ST+ 15	
152 "PROF"	
153 XEQ "0"	PROFIT
154 "SSE"	
155 RCL 36	
156 ST+ 15	
157 XEQ "0"	SPECIAL SUPPORT EQUIPMENT
158 "IT"	
159 RCL 35	
160 ST+ 15	
161 XEQ "0"	INITIAL TRAINING
162 "EN"	
163 RCL 45	
164 ST+ 15	



165 XEQ "0"	ENGINE
166 "AV"	
167 RCL 46	
168 ST+ 15	
169 XEQ "0"	AVIONICS
170 "TOT IS"	
171 RCL 15	
172 XEQ "0"	TOTAL INITIAL SPARES
173 "AVP"	
174 PCLPS	CLEAR PROGRAM
175♦LBL 54	WORKING LABELS SUBPROGRAM
176 1000	
177 *	
178 RTN	
179♦LBL 55	
180 RCL 30	
181 *	
182 RTN	
183♦LBL 56	
184 0	
185 STO 32	
186 STO 33	
187 RTN	
188♦LBL 57	
189 0	
190 STO 31	
191 STO 36	
192 RTN	
193 .END.	

01♦LBL "OSD	CARGO OPERATIONS AND SUPPORT
"	FIRST SUBPROGRAM DATA
02 XEQ "P"	
03 "L1"	GET WORKING LABELS
04 GETSUB	
05 RCL 74	INPUT DATA
06 XEQ "18"	
07 1.691	
08 XEQ "15"	
09 RCL 92	
10 XEQ "18"	
11 8.966 E-	
02	
12 XEQ "15"	
13 RCL 56	
14 XEQ "18"	
15 2.339 E-	
02	
16 XEQ "15"	
17 14.421	
18 XEQ "15"	
19 RCL 76	
20 XEQ "18"	
21 6.425 E-	
02	
22 XEQ "15"	
23 "MLD"	
24 XEQ "16"	
25 STO 03	
26 .613 E-0	
3	
27 XEQ "15"	
28 1.956	
29 XEQ "15"	
30 RCL 74	
31 XEQ "18"	
32 .401	
33 XEQ "15"	
34 RCL 85	
35 XEQ "18"	
36 4.648	
37 XEQ "15"	
38 RCL 55	
39 XEQ "18"	
40 .148	
41 XEQ "15"	
42 -.856	
43 XEQ "15"	
44 RCL 91	
45 XEQ "18"	
46 1.505 E-	
03	
47 XEQ "15"	
48 "CSW"	
49 XEQ "16"	

```

50 XEQ "18"
51 2.915 E-
    03
52 XEQ "15"
53 24.28
54 XEQ "15"
55 RCL 56
56 XEQ "18"
57 .367 E-0
    3
58 XEQ "15"
59 4.286 E-
    04
60 XEQ "15"
61 .419
62 XEQ "15"
63 "*PCP"
64 XEQ "16"
65 RCL 61
66 XEQ "18"
67 RCL 85
68 XEQ "18"
69 3.523
70 XEQ "15"
71 1.927
72 XEQ "15"
73 -8.698
74 XEQ "15"
75 4.329 E-
    02
76 XEQ "15"
77 RCL 69
78 XEQ "18"
79 2.096
80 XEQ "15"
81 "MVSQ"
82 XEQ "16"
83 2.357 E-
    09
84 XEQ "15"
85 RCL 56
86 XEQ "18"
87 2.356 E-
    02
88 XEQ "15"
89 10.917
90 XEQ "15"
91 RCL 83
92 1 E-03
93 *
94 RCL 69
95 /
96 XEQ "18"
97 RCL 56
98 XEQ "18"

```

```

99 2.31
100 XEQ "15"
101 -1.32
102 XEQ "15"
103 22.931
104 XEQ "15"
105 RCL 83
106 1 E-03
107 *
108 RCL 69
109 /
110 XEQ "18"
111 RCL 03
112 1 E-03
113 *
114 XEQ "18"
115 "=LGB"
116 XEQ "16"
117 1.989
118 XEQ "15"
119 -2.274
120 XEQ "15"
121 .348
122 XEQ "15"
123 .131
124 XEQ "15"
125 RCL 99
126 XEQ "18"
127 .133
128 XEQ "15"
129 RCL 56
130 XEQ "18"
131 6.41 E-0
3
132 XEQ "15"
133 3.469
134 XEQ "15"
135 RCL 76
136 XEQ "18"
137 .974 E-0
2
138 XEQ "15"
139 RCL 85
140 XEQ "18"
141 .094
142 XEQ "15"
143 .28
144 XEQ "15"
145 RCL 62
146 1 E-03
147 *
148 XEQ "18"
149 "MAL"
150 PROMPT
151 1 E-03

```

152 *	
153 XEQ "18"	
154 RCL 56	
155 XEQ "18"	
156 .239	
157 XEQ "15"	
158 1.756	
159 XEQ "15"	
160 -.515	
161 XEQ "15"	
162 2.898 E-	
03	
163 XEQ "15"	
164 "OSD"	
165 PCLPS	CLEAR PROGRAM
166 .END.	
01♦LBL "OSP	EXECUTE FIRST SUBPROGRAM
"	
02 XEQ "R"	
03 "L2"	GET WORKING LABELS
04 GETSUB	
05 "L3"	
06 GETSUB	
07 "L5"	
08 GETSUB	
09 RCL 30	NUMBER OF AIRCRAFT SUPPORTED
10 "%SUP?"	
11 PROMPT	
12 STO 30	
13 *	
14 STO 30	
15 XEQ "44"	STRUCTURE
16 STO 17	BASE LEVEL MAINTENANCE
17 XEQ "48"	
18 STO 51	REPLENISHMENT SPARES
19 XEQ "47"	
20 STO 48	DEPOT COMPONENT REPAIR
21 XEQ "48"	CREW
22 ST+ 17	BLM
23 XEQ "46"	
24 ST+ 51	RS
25 XEQ "7"	
26 ST+ 48	DCR
27 XEQ "44"	LANDING GEAR
28 "L/M?"	
29 PROMPT	
30 RCL 43	
31 *	
32 *	
33 RCL 30	
34 *	
35 STO 04	BLM
36 XEQ "9"	
37 ST+ 51	RS
38 XEQ "7"	

39 ST+ 48	DCR
40 XEQ "39"	FLIGHT CONTROLS
41 XEQ "39"	
42 -	
43 XEQ "41"	
44 ST+ 17	BLM
45 XEQ "48"	
46 ST+ 51	RS
47 XEQ "7"	
48 ST+ 48	DCR
49 "OSP"	
50 PCLPS	CLEAR PROGRAM
51 .END.	
01♦LBL "APU"	SECOND SUBPROGRAM DATA
"	
02 XEQ "R"	
03 "L1"	GET WORKING LABELS
04 GETSUB	
05 "L4"	
06 GETSUB	
07 RCL 87	INPUT DATA
08 XEQ "18"	
09 2.767 E-	
04	
10 XEQ "15"	
11 RCL 56	
12 XEQ "18"	
13 3.63 E-0	
3	
14 XEQ "15"	
15 3.868	
16 XEQ "15"	
17 RCL 78	
18 XEQ "18"	
19 41.73	
20 XEQ "15"	
21 RCL 91	
22 XEQ "18"	
23 1.257 E-	
04	
24 XEQ "15"	
25 41.998	
26 XEQ "15"	
27 RCL 78	
28 XEQ "18"	
29 RCL 56	
30 XEQ "18"	
31 "APUW"	
32 PROMPT	
33 1 E-03	
34 *	
35 XEQ "18"	
36 3.785	
37 XEQ "15"	
38 -.534	

```

39 XEQ "15"
40 .704
41 XEQ "15"
42 27.025
43 XEQ "15"
44 RCL 61
45 XEQ "18"
46 .124
47 XEQ "15"
48 RCL 74
49 XEQ "18"
50 .465
51 XEQ "15"
52 RCL 56
53 XEQ "18"
54 9.96 E-0
    3
55 XEQ "15"
56 2.629
57 XEQ "15"
58 "ECSW"
59 PROMPT
60 RCL 87
61 /
62 XEQ "18"
63 21.037
64 XEQ "15"
65 RCL 56
66 XEQ "18"
67 1.866 E-
    03
68 XEQ "15"
69 .468
70 XEQ "15"
71 "CT"
72 PROMPT
73 RCL 75
74 "PCP"
75 PROMPT
76 XEQ "35"
77 XEQ "18"
78 4.507
79 XEQ "15"
80 RCL 85
81 XEQ "18"
82 8.434
83 XEQ "15"
84 .78
85 XEQ "15"
86 RCL 92
87 XEQ "18"
88 3.392 E-
    02
89 XEQ "15"
90 RCL 85

```

91 XEQ "18"  
 92 5.027  
 93 XEQ "15"  
 94 RCL 56  
 95 XEQ "18"  
 96 2.764 E-  
     02  
 97 XEQ "15"  
 98 12.77  
 99 XEQ "15"  
 100 "G"  
 101 XEQ "16"  
 102 STO 09  
 103 6.468  
 104 XEQ "15"  
 105 RCL 58  
 106 XEQ "18"  
 107 3.375 E-  
     02  
 108 XEQ "15"  
 109 34.368  
 110 XEQ "15"  
 111 RCL 58  
 112 XEQ "18"  
 113 3.516 E-  
     02  
 114 XEQ "15"  
 115 RCL 09  
 116 XEQ "18"  
 117 1.555  
 118 XEQ "15"  
 119 RCL 56  
 120 XEQ "18"  
 121 1.17 E-0  
     2  
 122 XEQ "15"  
 123 6.018  
 124 XEQ "15"  
 125 RCL 75  
 126 XEQ "18"  
 127 8.442  
 128 XEQ "15"  
 129 RCL 85  
 130 XEQ "18"  
 131 4.853  
 132 XEQ "15"  
 133 RCL 56  
 134 XEQ "18"  
 135 3.123 E-  
     02  
 136 XEQ "15"  
 137 3.26  
 138 XEQ "15"  
 139 RCL 62  
 140 XEQ "18"



141	1.639 E-	
	05	
142	XEQ "15"	
143	RCL 85	
144	XEQ "18"	
145	1.977	
146	XEQ "15"	
147	4.707	
148	XEQ "15"	
149	RCL 62	
150	XEQ "18"	
151	3.912 E-	
	05	
152	XEQ "15"	
153	RCL 75	
154	XEQ "18"	
155	1.658	
156	XEQ "15"	
157	RCL 85	
158	XEQ "18"	
159	4.568	
160	XEQ "15"	
161	8.978	
162	XEQ "15"	
163	"APU"	
164	PCLPS	CLEAR PROGRAM
165	.END.	
01	LBL "APU P"	EXECUTE SECOND SUBPROGRAM
02	XEQ "R"	
03	"L2"	GET WORKING LABELS
04	GETSUB	
05	"L5"	
06	GETSUB	
07	XEQ "48"	AUXILLIARY POWER UNIT
08	ST+ 17	BLM
09	XEQ "46"	
10	ST+ 51	RS
11	XEQ "7"	
12	ST+ 48	DCR
13	XEQ "44"	ENVIRONMENTAL CONTROL
14	ST+ 17	BLM
15	XEQ "48"	
16	ST+ 51	RS
17	XEQ "48"	
18	ST+ 48	DCR
19	XEQ "44"	ELECTRICAL
20	ST+ 17	BLM
21	XEQ "46"	
22	ST+ 51	RS
23	XEQ "44"	
24	ST+ 48	DCR
25	XEQ "44"	ENGINE INSTALLATION
26	ST+ 17	BLM

27 XEQ "48"	
28 ST+ 51	RS
29 XEQ "44"	
30 ST+ 48	DCR
31 "APUP"	
32 PCLPS	CLEAR SUBPROGRAM
33 .END.	
01♦LBL "HYD"	THIRD SUBPROGRAM DATA
02 XEQ "R"	
03 186	
04 PSIZE	SET STORAGE REGISTER SIZE
05 "L1"	GET WORKING LABEL
06 GETSUB	
07 "*HP"	INPUT DATA
08 XEQ "16"	
09 STO 11	
10 8.486	
11 XEQ "15"	
12 RCL 76	
13 XEQ "18"	
14 .882	
15 XEQ "15"	
16 RCL 56	
17 XEQ "18"	
18 5.111 E-	
02	
19 XEQ "15"	
20 9.425	
21 XEQ "15"	
22 "*HSPS"	
23 PROMPT	
24 RCL 72	
25 +	
26 XEQ "18"	
27 .881	
28 XEQ "15"	
29 RCL 56	
30 XEQ "18"	
31 1.233 E-	
02	
32 XEQ "15"	
33 .528	
34 XEQ "15"	
35 "*ATM"	
36 XEQ "16"	
37 10.59	
38 XEQ "15"	
39 "*PTU"	
40 XEQ "16"	
41 1.48	
42 XEQ "15"	
43 RCL 78	
44 XEQ "18"	

```

45 17.504
46 XEQ "15"
47 RCL 56
48 XEQ "18"
49 1.946 E-
    02
50 XEQ "15"
51 RCL 86
52 XEQ "18"
53 .513
54 XEQ "15"
55 7.058
56 XEQ "15"
57 "FUSW"
58 XEQ "16"
59 4.001 E-
    05
60 XEQ "15"
61 "*FUBP?"
62 PROMPT
63 STO 12
64 RCL 86
65 +
66 XEQ "18"
67 5.043 E-
    02
68 XEQ "15"
69 .872
70 XEQ "15"
71 RCL 86
72 RCL 12
73 +
74 XEQ "18"
75 .214
76 XEQ "15"
77 RCL 56
78 XEQ "18"
79 3.73 E-0
    3
80 XEQ "15"
81 RCL 85
82 XEQ "18"
83 2.574
84 XEQ "15"
85 8.097
86 XEQ "15"
87 RCL 61
88 XEQ "18"
89 3.453 E-
    02
90 XEQ "15"
91 RCL 93
92 RCL 91
93 /
94 XEQ "18"

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95 .929  
 96 XEQ "15"  
 97 5.539  
 98 XEQ "15"  
 99 RCL 91  
 100 XEQ "18"  
 101 3.594 E-  
     04  
 102 XEQ "15"  
 103 RCL 85  
 104 XEQ "18"  
 105 .484  
 106 XEQ "15"  
 107 1.491 E-  
     02  
 108 XEQ "15"  
 109 RCL 83  
 110 XEQ "18"  
 111 9.65 E-0  
     6  
 112 XEQ "15"  
 113 RCL 85  
 114 XEQ "18"  
 115 1.489  
 116 XEQ "15"  
 117 4.5  
 118 XEQ "15"  
 119 RCL 50  
 120 .4966  
 121 \*  
 122 RCL 96  
 123 RCL 97  
 124 +  
 125 /  
 126 XEQ "18"  
 127 .107  
 128 XEQ "15"  
 129 RCL 56  
 130 XEQ "18"  
 131 .121  
 132 XEQ "15"  
 133 RCL 58  
 134 XEQ "18"  
 135 .449  
 136 XEQ "15"  
 137 73.974  
 138 XEQ "15"  
 139 RCL 50  
 140 .4966  
 141 \*  
 142 XEQ "18"  
 143 3.486 E-  
     05  
 144 XEQ "15"  
 145 "\*ANT"

146 XEQ "16"  
 147 1.198  
 148 XEQ "15"  
 149 RCL 64  
 150 XEQ "18"  
 151 .183  
 152 XEQ "15"  
 153 4.021  
 154 XEQ "15"  
 155 RCL 96  
 156 RCL 97  
 157 +  
 158 XEQ "18"  
 159 1.271 E-  
       02  
 160 XEQ "15"  
 161 RCL 50  
 162 .4966  
 163 \*  
 164 XEQ "18"  
 165 1.684 E-  
       04  
 166 XEQ "15"  
 167 RCL 56  
 168 XEQ "18"  
 169 .109  
 170 XEQ "15"  
 171 58.813  
 172 XEQ "15"  
 173 RCL 56  
 174 XEQ "18"  
 175 130  
 176 XEQ "15"  
 177 RCL 77  
 178 XEQ "18"  
 179 50482  
 180 XEQ "15"  
 181 RCL 82  
 182 XEQ "18"  
 183 1609  
 184 XEQ "15"  
 185 486459  
 186 XEQ "15"  
 187 RCL 57  
 188 1 E-03  
 189 \*  
 190 XEQ "18"  
 191 RCL 85  
 192 XEQ "18"  
 193 RCL 93  
 194 1 E-03  
 195 \*  
 196 RCL 92  
 197 /  
 198 XEQ "18"

199	2.531	
200	XEQ "15"	
201	-1.861	
202	XEQ "15"	
203	.569	
204	XEQ "15"	
205	4497.4	
206	XEQ "15"	
207	"HYD"	CLEAR PROGRAM
208	PCLPS	
209	.END.	
01	LBL "HYD P"	EXECUTE THIRD SUBPROGRAM
02	XEQ "R"	
03	"L2"	GET WORKING LABELS
04	GETSUB	
05	"L4"	
06	GETSUB	
07	"L5"	
08	GETSUB	
09	XEQ "42"	HYDRAULICS/PNEUMATICS
10	XEQ "39"	
11	-	
12	XEQ "41"	
13	ST+ 17	BLM
14	XEQ "48"	
15	ST+ 51	RS
16	XEQ "42"	
17	RCL 11	
18	+	
19	1.026	
20	*	
21	5.426	
22	+	
23	ST+ 48	DCR
24	XEQ "47"	FUEL SYSTEM
25	ST+ 17	BLM
26	XEQ "46"	
27	ST+ 51	RS
28	XEQ "43"	
29	XEQ "39"	
30	-	
31	XEQ "40"	
32	ST+ 48	DCR
33	XEQ "46"	CARGO HANDLING
34	ST+ 17	BLM
35	XEQ "48"	
36	ST+ 51	RS
37	XEQ "48"	
38	ST+ 48	DCR
39	XEQ "47"	AVIONICS
40	ST+ 17	BLM
41	XEQ "42"	
42	XEQ "39"	

43	-	
44	XEQ "41"	
45	ST+ 51	RS
46	XEQ "44"	
47	ST+ 48	DCR
48	XEQ "42"	BASE LEVEL OPERATIONS
49	XEQ "39"	
50	+	
51	XEQ "41"	
52	RCL 43	
53	12	
54	/	
55	*	
56	"NOAC?"	
57	PROMPT	
58	STO 31	
59	*	
60	STO 14	
61	RCL 56	BASE LEVEL TRAINING
62	54.9	
63	*	
64	RCL 77	
65	21079	
66	*	
67	+	
68	RCL 82	
69	1185	
70	*	
71	+	
72	241567	
73	-	
74	RCL 43	
75	12	
76	/	
77	*	
78	RCL 31	
79	*	
80	STO 15	
81	XEQ "7"	DEPOT AIRFRAME
82	RCL 43	
83	12	
84	/	
85	*	
86	RCL 31	
87	*	
88	STO 16	
89	"HYDP"	CLEAR PROGRAM
90	PCLPS	
91	.END.	
01	LBL "EN"	ENGINE DATA
02	XEQ "R"	
03	"L1"	GET WORKING LABELS

```

04 GETSUB
05 RCL 98
06 XEQ "18"
07 RCL 95
08 XEQ "18"
09 RCL 75
10 XEQ "18"
11 -1.521
12 XEQ "15"
13 -.136
14 XEQ "15"
15 1
16 XEQ "15"
17 1.018 E0
      2
18 XEQ "15"
19 RCL 95
20 XEQ "18"
21 "ENTWR"
22 XEQ "16"
23 RCL 98
24 XEQ "18"
25 RCL 75
26 XEQ "18"
27 -1.322
28 XEQ "15"
29 .884
30 XEQ "15"
31 .667
32 XEQ "15"
33 1
34 XEQ "15"
35 1.348 E0
      5
36 XEQ "15"
37 RCL 95
38 XEQ "18"
39 RCL 49
40 .3499
41 "
42 XEQ "18"
43 RCL 75
44 XEQ "18"
45 -.76
46 XEQ "15"
47 .257
48 XEQ "15"
49 1
50 XEQ "15"
51 3.328 F0
      2
52 XEQ "15"
53 "EN"
54 PCLPS
55 .END.

```

INPUT DATA

CLEAR PROGRAM



01 ♦ LBL "ENG"	EXECUTE ENGINE AND OPERATIONS AND
"	SUPPORT OUTPUT
02 XEQ "R"	
03 "L2"	GET WORKING LABELS
04 GETSUB	
05 "L3"	
06 GETSUB	
07 "L4"	
08 GETSUB	
09 "INF?"	INFLATION FACTOR
10 PROMPT	
11 STO 02	
12 RCL 17	
13 XEQ "27"	
14 RCL 04	
15 XEQ "1"	
16 +	
17 STO 17	BLM IN CUR \$
18 RCL 51	
19 XEQ "27"	
20 STO 51	RS IN CUR \$
21 RCL 48	
22 XEQ "27"	
23 STO 48	DCR IN CUR \$
24 XEQ "7"	ENGINE
25 XEQ "27"	
26 ST+ 17	BLM
27 XEQ "11"	
28 XEQ "27"	
29 ST+ 51	RS
30 XEQ "7"	
31 XEQ "27"	
32 ST+ 48	DCR
33 RCL 31	PETROLEUM, OIL, AND LUBRICANTS
34 STO 30	
35 "G/H?"	
36 PROMPT	
37 "C/G?"	
38 PROMPT	
39 1.05	
40 *	
41 *	
42 XEQ "27"	
43 "POL"	POL OUTPUT
44 XEQ "0"	
45 RCL 17	
46 STO 01	
47 "BLM"	BLM OUTPUT
48 XEQ "0"	
49 RCL 51	
50 ST+ 01	
51 "RS"	RS OUTPUT
52 XEQ "0"	
53 RCL 48	
54 ST+ 01	

55 "DCR"	
56 XEQ "0"	DCR OUTPUT
57 RCL 14	
58 XEQ "1"	
59 ST+ 01	
60 "BLO"	
61 XEQ "0"	BLO OUTPUT
62 RCL 15	
63 XEQ "1"	
64 ST+ 01	
65 "BLT"	BLT OUTPUT
66 XEQ "0"	
67 RCL 16	
68 XEQ "1"	
69 ST+ 01	
70 "PDM"	
71 XEQ "0"	DEPOT AIRFRAME OUTPUT
72 RCL 17	
73 RCL 48	
74 +	
75 .01	
76 *	
77 ST+ 01	
78 "OM"	
79 XEQ "0"	OTHER MAINTENANCE OUTPUT
80 RCL 01	
81 "TOT OES"	
82 XEQ "0"	TOTAL OPERATIONS AND SUPPORT OUTPUT
83 "ENG"	
84 PCLPS	CLEAR PROGRAM
85 .END.	

01	LEL "FTR	FIGHTER OPERATIONS AND SUPPORT
	"	FIRST SUBPROGRAM DATA
02	XEQ "R"	
03	"L1"	GET WORKING LABELS
04	GETSUB	
05	RCL 57	INPUT DATA
06	XEQ "18"	
07	RCL 56	
08	XEQ "18"	
09	RCL 88	
10	XEQ "18"	
11	1.138	
12	XEQ "15"	
13	-.693	
14	XEQ "15"	
15	2.912	
16	XEQ "15"	
17	1.207 E-	
	04	
18	XEQ "15"	
19	RCL 57	
20	XEQ "18"	
21	RCL 62	
22	XEQ "18"	
23	.518	
24	XEQ "15"	
25	.781	
26	XEQ "15"	
27	4.578 E-	
	05	
28	XEQ "15"	
29	RCL 77	
30	XEQ "18"	
31	RCL 88	
32	XEQ "18"	
33	RCL 56	
34	XEQ "18"	
35	1.347	
36	XEQ "15"	
37	5.107	
38	XEQ "15"	
39	-.285	
40	XEQ "15"	
41	1.304 E-	
	05	
42	XEQ "15"	
43	RCL 87	
44	XEQ "18"	
45	RCL 56	
46	XEQ "18"	
47	.306	
48	XEQ "15"	
49	-1.464	
50	XEQ "15"	

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51 2.557 E0
   3
52 XEQ "15"
53 RCL 77
54 XEQ "18"
55 RCL 64
56 XEQ "18"
57 .642
58 XEQ "15"
59 .111
60 XEQ "15"
61 2.552
62 XEQ "15"
63 "SS"
64 PROMPT
65 STO 05
66 XEQ "18"
67 RCL 62
68 XEQ "18"
69 .241
70 XEQ "15"
71 .989
72 XEQ "15"
73 2.043 E-
   04
74 XEQ "15"
75 RCL 05
76 XEQ "18"
77 RCL 63
78 XEQ "18"
79 .779
80 XEQ "15"
81 .918
82 XEQ "15"
83 2.655 E-
   04
84 XEQ "15"
85 .348
86 XEQ "15"
87 .257
88 XEQ "15"
89 1.118
90 XEQ "15"
91 RCL 82
92 XEQ "18"
93 RCL 79
94 XEQ "18"
95 RCL 56
96 XEQ "18"
97 .622
98 XEQ "15"
99 .691
100 XEQ "15"
101 -.654
102 XEQ "15"

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103 2.871  
104 XEQ "15"  
105 RCL 82  
106 XEQ "18"  
107 RCL 81  
108 XEQ "18"  
109 RCL 79  
110 XEQ "18"  
111 1.067  
112 XEQ "15"  
113 .361  
114 XEQ "15"  
115 .05  
116 XEQ "15"  
117 .182  
118 XEQ "15"  
119 RCL 63  
120 XEQ "18"  
121 RCL 56  
122 XEQ "18"  
123 .454  
124 XEQ "15"  
125 -.05  
126 XEQ "15"  
127 .533  
128 XEQ "15"  
129 RCL 81  
130 XEQ "18"  
131 4.085  
132 XEQ "15"  
133 RCL 75  
134 XEQ "18"  
135 1.633  
136 XEQ "15"  
137 RCL 80  
138 XEQ "18"  
139 .366  
140 XEQ "15"  
141 27.369  
142 XEQ "15"  
143 RCL 59  
144 XEQ "18"  
145 RCL 75  
146 XEQ "18"  
147 .182  
148 XEQ "15"  
149 1.005  
150 XEQ "15"  
151 1.061  
152 XEQ "15"  
153 RCL 80  
154 XEQ "18"  
155 RCL 75  
156 XEQ "18"  
157 -2.101

158	XEQ "15"	
159	.598	
160	XEQ "15"	
161	8.138 E0	
	4	
162	XEQ "15"	
163	"FTR"	CLEAR PROGRAM
164	PCLPS	
165	.END.	
01	LBL "FTR"	EXECUTE FIRST SUBPROGRAM
	P"	
02	XEQ "R"	
03	"L2"	GET WORKING LABELS
04	GETSUB	
05	XEQ "7"	STRUCTURE
06	STO 17	BASE LEVEL MAINTENANCE (BLM)
07	XEQ "9"	
08	STO 51	REPLENISHMENT SPARES (RS)
09	XEQ "7"	CREW
10	ST+ 17	BLM
11	XEQ "9"	
12	ST+ 51	RS
13	XEQ "9"	
14	STO 48	DEPOT COMPONENT REPAIR (DCR)
15	XEQ "9"	LANDING GEAR
16	ST+ 17	BLM
17	XEQ "9"	
18	ST+ 51	RS
19	2	
20	ST- 01	
21	XEQ "9"	
22	ST+ 48	DCR
23	XEQ "7"	FLIGHT CONTROLS
24	ST+ 17	BLM
25	XEQ "7"	
26	ST+ 51	RS
27	XEQ "9"	
28	ST+ 48	DCR
29	RCL 81	ENGINE INSTALLATION
30	4.085	
31	*	
32	RCL 75	
33	1.633	
34	*	
35	+	
36	RCL 80	
37	.366	
38	*	
39	+	
40	27.369	
41	-	
42	ST+ 17	BLM
43	XEQ "9"	
44	ST+ 51	RS

45 XEQ "9"	
46 ST+ 48	DCR
47 "FTRP"	
48 PCLPS	CLEAR PROGRAM
49 .END.	
01 LBL "OSD	SECOND SUBPROGRAM DATA
2"	
02 XEQ "R"	
03 "L1"	GET WORKING LABEL
04 GETSUB	
05 RCL 82	INPUT DATA
06 XEQ "18"	
07 RCL 81	
08 XEQ "18"	
09 RCL 56	
10 XEQ "18"	
11 .649	
12 XEQ "15"	
13 .295	
14 XEQ "15"	
15 -.814	
16 XEQ "15"	
17 48.065	
18 XEQ "15"	
19 RCL 81	
20 XEQ "18"	
21 RCL 60	
22 XEQ "18"	
23 RCL 82	
24 XEQ "18"	
25 .632	
26 XEQ "15"	
27 .315	
28 XEQ "15"	
29 1.207	
30 XEQ "15"	
31 1.789 E-	
03	
32 XEQ "15"	
33 RCL 94	
34 XEQ "18"	
35 RCL 82	
36 XEQ "18"	
37 1.267	
38 XEQ "15"	
39 .749	
40 XEQ "15"	
41 3.56 E-0	
4	
42 XEQ "15"	
43 RCL 58	
44 XEQ "18"	
45 RCL 77	
46 XEQ "18"	

47 .096  
 48 XEQ "15"  
 49 .773  
 50 XEQ "15"  
 51 16.077  
 52 XEQ "15"  
 53 RCL 58  
 54 XEQ "18"  
 55 RCL 82  
 56 XEQ "18"  
 57 .115  
 58 XEQ "15"  
 59 1.535  
 60 XEQ "15"  
 61 1.031 E-  
     02  
 62 XEQ "15"  
 63 RCL 58  
 64 XEQ "18"  
 65 .129  
 66 XEQ "15"  
 67 18.863  
 68 XEQ "15"  
 69 RCL 72  
 70 XEQ "18"  
 71 RCL 56  
 72 XEQ "18"  
 73 .06  
 74 XEQ "15"  
 75 -.996  
 76 XEQ "15"  
 77 5.042 E0  
     3  
 78 XEQ "15"  
 79 RCL 82  
 80 XEQ "18"  
 81 RCL 56  
 82 XEQ "18"  
 83 2.115  
 84 XEQ "15"  
 85 -.741  
 86 XEQ "15"  
 87 2.343 E-  
     02  
 88 XEQ "15"  
 89 RCL 72  
 90 XEQ "18"  
 91 RCL 56  
 92 XEQ "18"  
 93 .095  
 94 XEQ "15"  
 95 -.594  
 96 XEQ "15"  
 97 189.53  
 98 XEQ "15"



99 RCL 84  
 100 XEQ "18"  
 101 RCL 81  
 102 XEQ "18"  
 103 1.247  
 104 XEQ "15"  
 105 .82  
 106 XEQ "15"  
 107 5.746 E-  
     05  
 108 XEQ "15"  
 109 RCL 84  
 110 XEQ "18"  
 111 RCL 71  
 112 XEQ "18"  
 113 1.43  
 114 XEQ "15"  
 115 .979  
 116 XEQ "15"  
 117 1.941 E-  
     06  
 118 XEQ "15"  
 119 RCL 84  
 120 XEQ "18"  
 121 RCL 71  
 122 XEQ "18"  
 123 .298  
 124 XEQ "15"  
 125 .012  
 126 XEQ "15"  
 127 .877  
 128 XEQ "15"  
 129 RCL 73  
 130 XEQ "18"  
 131 RCL 82  
 132 XEQ "18"  
 133 .632  
 134 XEQ "15"  
 135 .89  
 136 XEQ "15"  
 137 .299  
 138 XEQ "15"  
 139 RCL 97  
 140 XEQ "18"  
 141 RCL 56  
 142 XEQ "18"  
 143 .187  
 144 XEQ "15"  
 145 -1.657  
 146 XEQ "15"  
 147 5.692 E0  
     5  
 148 XEQ "15"  
 149 RCL 96  
 150 XEQ "18"

151	RCL	60	
152	XEQ	"18"	
153		1.482	
154	XEQ	"15"	
155		1.338	
156	XEQ	"15"	
157		1.268 E-	
		05	
158	XEQ	"15"	
159	RCL	96	
160	XEQ	"18"	
161	RCL	64	
162	XEQ	"18"	
163		2.431	
164	XEQ	"15"	
165		1.084	
166	XEQ	"15"	
167		5.286 E-	
		09	
168	XEQ	"15"	
169	"OSD2"		CLEAR PROGRAM
170	PCLPS		
171	.END.		
01	LBL	"OSF	EXECUTE SECOND SUBPROGRAM
		2"	
02	XEQ	"R"	
03	"L2"		GET WORKING LABEL
04	GETSUB		
05	XEQ	"7"	ENVIRONMENTAL CONTROL SYSTEM
06	ST+	17	BLM
07	XEQ	"7"	
08	ST+	51	RS
09	XEQ	"9"	
10	ST+	48	DCR
11	XEQ	"9"	ELECTRICAL
12	ST+	17	BLM
13	XEQ	"9"	
14	ST+	51	RS
15	RCL	IND	
		00	
16	RCL	IND	
		01	
17	YTX		
18	XEQ	"8"	
19	RCL	IND	
		00	
20	*		
21	XEQ	"4"	
22	ST+	48	DCR
23	XEQ	"9"	HYDRAULIC/PNEUMATIC
24	ST+	17	BLM
25	XEQ	"9"	
26	ST+	51	RS
27	XEQ	"9"	

28 ST+ 48	DCR
29 XEQ "9"	FUEL SYSTEM
30 ST+ 17	BLM
31 XEQ "9"	
32 ST+ 51	RS
33 XEQ "9"	
34 ST+ 48	DCR
35 XEQ "9"	ARMAMENT
36 ST+ 17	BLM
37 XEQ "9"	AVIONICS
38 ST+ 17	BLM
39 XEQ "9"	
40 ST+ 51	RS
41 XEQ "9"	
42 ST+ 48	DCR
43 "OSP2"	
44 PCLPS	CLEAR PROGRAM
45 .END.	
01 LBL "FT"	THIRD SUBPROGRAM DATA
02 XEQ "R"	
03 "L1"	GET WORKING LABEL
04 GETSUB	
05 RCL 59	INPUT DATA
06 XEQ "18"	
07 RCL 56	
08 XEQ "18"	
09 .371	
10 XEQ "15"	
11 .14	
12 XEQ "15"	
13 8.052 E0	
	2
14 XEQ "15"	
15 RCL 60	
16 XEQ "18"	
17 RCL 82	
18 XEQ "18"	
19 .079	
20 XEQ "15"	
21 .912	
22 XEQ "15"	
23 1.303 E0	
	3
24 XEQ "15"	
25 RCL 82	
26 XEQ "18"	
27 RCL 88	
28 XEQ "18"	
29 RCL 56	
30 XEQ "18"	
31 3.284	
32 XEQ "15"	
33 2.043	
34 XEQ "15"	

35	.642	
36	XEQ "15"	
37	9.996 E-	
	07	
38	XEQ "15"	
39	"FT"	CLEAR PROGRAM
40	PCLPS	
41	.END.	
01	LBL "FTP"	EXECUTE THIRD SUBPROGRAM
	"	
02	XEQ "R"	
03	"L2"	GET WORKING LABEL
04	GETSUB	
05	XEQ "9"	BASE LEVEL OPERATIONS (BLO)
06	RCL 43	
07	12	
08	/	
09	*	
10	"NOAC?"	
11	PROMPT	
12	STO 31	
13	*	
14	STO 14	
15	XEQ "9"	BASE LEVEL TRAINING (BLT)
16	RCL 43	
17	12	
18	/	
19	*	
20	RCL 31	
21	*	
22	STO 15	
23	XEQ "7"	DEPOT AIRFRAME (PDM)
24	RCL 43	
25	12	
26	/	
27	*	
28	RCL 31	
29	*	
30	STO 16	
31	"FTP"	CLEAR PROGRAM
32	PCLPS	
33	.END.	

01♦LBL "LN CURV"	LEARNING CURVE MODEL
02 "U"	
03 ASTO Y	
04 "UNIT/CU M?"	SELECT UNIT CURVE OR CUMULATIVE AVERAGE CURVE EQUATIONS
05 PROMPT	
06 ASTO X	
07 X*Y?	
08 SF 01	
09 "≠ UNITS ?"	TOTAL NUMBER OF UNITS?
10 PROMPT	
11 STO 01	
12 STO 02	
13 "UNIT OF INT?"	UNIT OF INTEREST?
14 PROMPT	
15 STO 03	
16 1	
17 -	
18 STO 04	
19 "UNIT 1 COST?"	FIRST UNIT COST?
20 PROMPT	
21 STO 05	
22 "% LEARN ?"	LEARNING RATE? (DECIMAL)
23 PROMPT	
24 LN	
25 2	
26 LN	
27 /	
28 STO 06	$UC = K(X)^{\frac{LN\%}{LN^2}}$
29 RCL 05	
30 RCL 03	
31 XEQ 05	
32 STO 08	
33 FS? 01	
34 GTO 01	
35 XEQ 04	UNIT COST OUTPUT
36 0	
37 STO 07	
38♦LBL 02	UNIT CURVE SUMMATION LOOP
39 RCL 05	
40 RCL 01	
41 XEQ 05	$TC = \sum_{i=1}^N K(X_i)^{\frac{LN\%}{LN^2}}$
42 ST+ 07	
43 DSE 01	
44 GTO 02	
45 RCL 07	
46 XEQ 03	TOTAL COST OUTPUT

47♦LBL 01	CUMULATIVE CURVE
48 RCL 08	
49 RCL 03	
50 *	$UC = TC_X - TC(X-1)$
51 RCL 05	
52 RCL 04	
53 XEQ 05	
54 RCL 04	
55 *	
56 -	
57 XEQ 04	UNIT COST OUTPUT
58 RCL 05	
59 RCL 02	$TC_X = X(\bar{Y}_X)$
60 XEQ 05	
61 RCL 02	$Y_X = K(X^{\frac{LN\%}{LN 2}})$
62 *	TOTAL COST OUTPUT
63 XEQ 03	WORKING LABELS
64♦LBL 03	
65 "TOT COS T"	
66 XEQ 06	
67 RTN	
68♦LBL 04	
69 "UN COST "	
70 XEQ 06	
71 RTN	
72♦LBL 05	
73 RCL 06	
74 Y↑X	
75 *	
76 RTN	
77♦LBL 06	
78 "F="	
79 ARCL X	
80 RVIEW	
81 FS? 55	
82 STOP	
83 RTN	
84 END	

01♦LBL "LSC" LRU/SRU LOGISTICS SUPPORT COSTS

02 63

03 STO 61

04 "BSC"

OUTPUT LABELS

05 XEQ 03

06 "BSTK"

07 XEQ 03

08 "DSC"

09 XEQ 03

10 "DSTK"

11 XEQ 03

12 "SIC"

13 XEQ 03

14 "TPC"

15 XEQ 03

16 "BMHC"

17 XEQ 03

18 "BMMH"

19 XEQ 03

20 "PNSH"

21 XEQ 03

22 "8MMC"

23 XEQ 03

24 "DMHC"

25 XEQ 03

26 "DMMH"

27 XEQ 03

28 "DMMC"

29 XEQ 03

30 "SDTC"

31 XEQ 03

32 "CSC"

33 XEQ 03

34 "QSC"

35 XEQ 03

36 "IMCC"

37 XEQ 03

38 "TOC"

39 XEQ 03

40 "LCC"

41 XEQ 03

42♦LBL A

43 0

44 STO 59

45 "DEVC"

INPUT DATA

46 XEQ 01

47 "SYSI"

48 XEQ 01

49 "SEC"

50 XEQ 01

51 "M"

52 XEQ 01

53 "AOH"  
54 XEQ 01  
55 "POH"  
56 XEQ 01  
57 "PIUP"  
58 XEQ 01  
59 "UC"  
60 XEQ 01  
61 "W"  
62 XEQ 01  
63 "MTBD"  
64 XEQ 01  
65 "MTBR"  
66 XEQ 01  
67 "NRTS"  
68 XEQ 01  
69 "RTS"  
70 XEQ 01  
71 "COND"  
72 XEQ 01  
73 "PAMH"  
74 XEQ 01  
75 "RMH"  
76 XEQ 01  
77 "SMI"  
78 XEQ 01  
79 "SMH"  
80 XEQ 01  
81 "BCMh"  
82 XEQ 01  
83 "BMH"  
84 XEQ 01  
85 "BMC"  
86 XEQ 01  
87 "BRCT"  
88 XEQ 01  
89 "DMH"  
90 XEQ 01  
91 "DMC"  
92 XEQ 01  
93 "PA"  
94 XEQ 01  
95 "PP"  
96 XEQ 01  
97 "PCB"  
98 XEQ 01  
99 "OST"  
100 XEQ 01  
101 "DRCT"  
102 XEQ 01  
103 "BLR"  
104 XEQ 01  
105 "DLR"  
106 XEQ 01  
107 "PSC"



108 XEQ 01  
109 "SA"  
110 XEQ 01  
111 "IMC"  
112 XEQ 01  
113 "RMC"  
114 XEQ 01

115♦LBL B  
116 CLA  
117 RCL 12  
118 RCL 21  
119 \*  
120 RCL 11  
121 RCL 27  
122 \*  
123 +

PIPELINE TIME IN MONTHS

124 STO 55  
125 RCL 05  
126 RCL 09  
127 RCL 03  
128 \*  
129 /  
130 STO 54  
131 RCL 55  
132 \*  
133 STO 36  
134 SQRT  
135 1.5

136 \*  
137 ST+ 36  
138 RCL 36  
139 XEQ "IN"

BASE SPARES

140 STO 36  
141 RCL 12  
142 RCL 19  
143 \*  
144 RCL 18  
145 +  
146 RCL 05  
147 RCL 03  
148 RCL 10  
149 \*

150 /  
151 \*

PEAK DIRECT BASE MAINTENANCE  
SHOP MANHOURS

152 STO 43  
153 RCL 36  
154 RCL 03  
155 \*

156 RCL 07  
157 \*

BASE SPARES COST

158 STO 35  
159 RCL 54  
160 RCL 03  
161 RCL 11

162	RCL	28	
163	*		
164	*		
165	*		
166	XEQ	"IN"	
167	STO	38	DEPOT SPARES
168	RCL	07	
169	*		
170	STO	37	DEPOT SPARES COST
171	RCL	04	
172	RCL	03	
173	/		
174	STO	54	
175	RCL	04	
176	RCL	10	
177	/		
178	STO	55	
179	RCL	14	
180	RCL	15	
181	RCL	18	
182	+		
183	+		
184	RCL	12	
185	RCL	19	
186	*		
187	+		
188	RCL	10	
189	/		
190	STO	42	
191	0		
192	RCL	16	
193	X=Y?		
194	GTO	04	
195	RCL	17	
196	RCL	16	
197	/		
198	ST+	42	
199	LBL	04	
200	RCL	54	
201	ST*	42	DIRECT MANHOURS PER BASE PER YEAR
202	RCL	42	
203	RCL	03	
204	RCL	06	
205	RCL	29	
206	*		
207	*		
208	*		
209	STO	41	BASE MAINTENANCE MANHOURS
210	RCL	55	
211	RCL	06	
212	RCL	12	
213	RCL	20	
214	*		
215	*		

216	*		
217	STO	44	BASE MAINTENANCE MANHOUR COST
218	RCL	55	
219	RCL	11	
220	RCL	22	
221	*		
222	*		
223	STO	46	DEPOT MAINTENANCE MANHOURS
224	RCL	06	
225	RCL	30	
226	*		
227	*		
228	STO	45	DEPOT MAINTENANCE MANHOUR COST
229	RCL	06	
230	ST*	55	
231	RCL	55	
232	RCL	13	
233	*		
234	XEQ	"IN"	
235	STO	50	CONDEMNATION SPARES
236	RCL	11	
237	ST*	55	
238	RCL	55	
239	RCL	23	
240	*		
241	STO	47	DEPOT MAINTENANCE MATERIAL COST
242	RCL	55	
243	2.7		
244	RCL	31	
245	RCL	08	
246	*		
247	*		
248	*		
249	STO	48	SECOND DESTINATION TRANSPORTATION COST
250	RCL	50	
251	RCL	07	
252	*		
253	STO	49	CONDEMNATION SPARES COST
254	RCL	06	
255	RCL	34	
256	*		
257	RCL	33	
258	+		
259	RCL	24	
260	RCL	25	
261	1		
262	+		
263	+		
264	*		
265	RCL	03	
266	RCL	32	
267	RCL	06	
268	*		
269	*		
270	RCL	24	

271	RCL	26	
272	+		
273	1		
274	+		
275	*		
276	+		
277	STO	51	INVENTORY MANAGEMENT COST
278	RCL	02	
279	RCL	35	
280	RCL	37	
281	+	-	
282	+		
283	STO	39	SUPPORT INVESTMENT COST
284	STO	40	TOTAL PROCUREMENT COST
285	STO	53	
286	RCL	01	
287	ST+	40	
288	ST+	53	
289	RCL	41	
290	RCL	44	
291	RCL	45	
292	RCL	47	
293	+		
294	+		
295	+	-	
296	RCL	48	
297	RCL	49	
298	RCL	51	
299	+		
300	+		
301	+		
302	ST+	53	TOTAL OWNERSHIP COST
303	STO	52	
304	RCL	00	
305	ST+	53	LIFE CYCLE COST
306	35		
307	STO	60	
308	35.05301		
309	STO	62	
310	63		
311	STO	61	
312	◆LBL	02	WORKING LABELS
313	RCL	IND	
		60	
314	ARCL	IND	
		61	
315	"F = \$"		
316	ARCL	X	
317	AVIEW		
318	STOP		
319	CLA		
320	1		
321	ST+	60	
322	ST+	61	

```

323 ISG 62
324 GTO 02
325 STOP

326♦LBL 01
327 "F?"
328 PROMPT
329 STO IND
           59

330 1
331 ST+ 59
332 CLA
333 RTN

334♦LBL 03
335 ASTO IND
           61

336 1
337 ST+ 61
338 RTN

339♦LBL "IN"
340 STO 56
341 FRC
342 0
343 X=Y?
344 GTO 05
345 RCL 56
346 INT
347 1
348 +
349 RTN

350♦LBL 05
351 RCL 56
352 RTN
353 .END.

```

01♦LBL "ORL      OPTIMAL REPAIR LEVEL ANALYSIS  
          A"

02 1  
03 STO 00  
04 "BRCYT"      INPUT DATA

05 XEQ 01  
06 "LWR"  
07 XEQ 02  
08 1  
09 ST+ 00  
10 "DSST"  
11 XEQ 01  
12 "NTDPR"  
13 XEQ 02  
14 "MCFR"  
15 XEQ 01  
16 "MCFP"  
17 XEQ 01  
18 "NRA"  
19 XEQ 01  
20 "NNRA"  
21 XEQ 01  
22 "MTBCT"  
23 XEQ 01  
24 "MTBF"  
25 XEQ 01  
26 "NB"  
27 XEQ 01  
28 "NB"  
29 XEQ 04  
30 "OST"  
31 XEQ 04  
32 "IL"  
33 XEQ 01  
34 "FRCPP"  
35 XEQ 01  
36 "PSLR"  
37 XEQ 04  
38 "PSMR"  
39 XEQ 04  
40 "PWR"  
41 XEQ 04  
42 "QPA"  
43 XEQ 01  
44 "MCA"  
45 XEQ 01  
46 "MHCT"  
47 XEQ 01  
48 "MCP"  
49 XEQ 01  
50 "DRPT"  
51 XEQ 01  
52 "FSAC"  
53 XEQ 01

54 "CRM"  
55 XEQ 01  
56 "SSR"  
57 XEQ 04  
58 "RMW"  
59 XEQ 01  
60 "TDOCP"  
61 XEQ 01  
62 "UC"  
63 XEQ 01  
64 "U/B"  
65 XEQ 01  
66 "OH/M"  
67 XEQ 01  
68 "UW"  
69 XEQ 01  
70 "PTR"  
71 XEQ 02  
72 "PTT"  
73 XEQ 02  
74 "DT"  
75 XEQ 02  
76 "TCP"  
77 XEQ 02  
78 RCL 39  
79 RCL 40  
80 RCL 27  
81 \*  
82 \*  
83 RCL 12  
84 /  
85 STO 50  
86 STO 51  
87 RCL 19  
88 12  
89 RCL 38  
90 XEQ 06  
91 ST+ 51  
92 RCL 25  
93 RCL 34  
94 \*  
95 RCL 23  
96 RCL 21  
97 +  
98 +  
99 STO 52  
100 RCL 26  
101 RCL 35  
102 \*  
103 RCL 24  
104 RCL 22  
105 +  
106 +  
107 STO 53  
108 RCL 15

CALCULATE DISCARD OPTION

```

109 RCL 14
110 /
111 RCL 52
112 *
113 RCL 16
114 RCL 14
115 /
116 RCL 53
117 *
118 +
119 STO 54
120 RCL 41
121 120
122 RCL 50
123 XEQ 06
124 ST+ 51
125 RCL 15
126 RCL 14
127 /
128 RCL 17
129 *
130 RCL 16
131 RCL 14
132 /
133 RCL 18
134 *
135 +
136 STO 55
137 RCL 50
138 *
139 STO 56
140 3
141 *
142 SQRT
143 RCL 56
144 +
145 RCL 38
146 *
147 ST+ 51
148 RCL 51
149 "DISCARD

```

DISCARD OPTION OUTPUT

```

150 XEQ 03
151 RCL 07
152 RCL 37
153 *
154 RCL 14
155 /
156 STO 51
157 RCL 19
158 1
159 -
160 RCL 43
161 *

```

CALCULATE INTERMEDIATE REPAIR OPTION



162 1  
163 +  
164 STO 57  
165 RCL 03  
166 40  
167 \*  
168 RCL 49  
169 +  
170 RCL 47  
171 RCL 45  
172 RCL 57  
173 XEQ 06  
174 ST+ 51  
175 RCL 01  
176 RCL 50  
177 \*  
178 STO 57  
179 RCL 55  
180 RCL 50  
181 \*  
182 STO 58  
183 3  
184 \*  
185 SQRT  
186 RCL 58  
187 +  
188 1  
189 RCL 20  
190 -  
191 \*  
192 RCL 33  
193 \*  
194 RCL 57  
195 3  
196 \*  
197 SQRT  
198 RCL 57  
199 +  
200 RCL 38  
201 \*  
202 +  
203 RCL 20  
204 RCL 33  
205 \*  
206 RCL 50  
207 \*  
208 12  
209 \*  
210 SQRT  
211 4.4  
212 \*  
213 +  
214 ST+ 51

215 RCL 50  
 216 12  
 217 RCL 19  
 218 RCL 29  
 219 XEQ 06  
 220 RCL 03  
 221 \*  
 222 ST+ 51  
 223 RCL 50  
 224 12  
 225 RCL 19  
 226 RCL 36  
 227 XEQ 06  
 228 RCL 54  
 229 \*  
 230 ST+ 51  
 231 RCL 10  
 232 RCL 11  
 233 +  
 234 RCL 32  
 235 RCL 19  
 236 \*  
 237 \*  
 238 ST+ 51  
 239 RCL 50  
 240 RCL 19  
 241 12  
 242 RCL 33  
 243 XEQ 06  
 244 ST+ 51  
 245 STO 57  
 246 RCL 30  
 247 RCL 19  
 248 1  
 249 -  
 250 \*  
 251 RCL 09  
 252 +  
 253 RCL 11  
 254 1  
 255 -  
 256 RCL 14  
 257 /  
 258 \*  
 259 STO 58  
 260 RCL 28  
 261 RCL 19  
 262 1  
 263 -  
 264 \*  
 265 RCL 08  
 266 +  
 267 RCL 10

268	RCL	14	
269	/		
270	*		
271	RCL	58	
272	+		
273	ST+	51	
274	ST+	57	
275	RCL	51	
276	"INTERME		OUTPUT INTERMEDIATE REPAIR OPTION
	DIATE"		
277	XEQ	03	
278	RCL	50	CALCULATE DEPOT REPAIR OPTION
279	RCL	31	
280	RCL	38	
281	*		
282	*		
283	ST+	57	
284	RCL	06	
285	RCL	37	
286	*		
287	RCL	14	
288	/		
289	ST+	57	
290	RCL	19	
291	1		
292	-		
293	RCL	42	
294	*		
295	1		
296	+		
297	ST0	51	
298	RCL	02	
299	40		
300	*		
301	RCL	48	
302	+		
303	RCL	46	
304	RCL	44	
305	RCL	51	
306	XEQ	06	
307	ST+	57	
308	RCL	50	
309	12		
310	RCL	19	
311	2		
312	XEQ	06	
313	RCL	41	
314	RCL	54	
315	*		
316	*		
317	ST+	57	
318	RCL	50	
319	RCL	05	

320 RCL 38  
321 \*  
322 \*  
323 ST+ 57  
324 RCL 56  
325 3  
326 \*  
327 SQRT  
328 RCL 56  
329 +  
330 RCL -38  
331 \*  
332 ST+ 57  
333 RCL 50  
334 12  
335 RCL 19  
336 RCL 29  
337 XEQ 06  
338 RCL 02  
339 \*  
340 ST+ 57  
341 RCL 57  
342 "DEPOT"  
343 XEQ 03

#### OUTPUT DEPOT REPAIR OPTION

344♦LBL 01  
345 "F?"  
346 XEQ 05  
347 RTN

#### WORKING LABELS

348♦LBL 02  
349 ASTO 04  
350 "FD?"  
351 XEQ 05  
352 CLA  
353 ARCL 04  
354 "FI?"  
355 XEQ 05  
356 RTN

357♦LBL 03  
358 "F="

359 ARCL X  
360 AVIEW  
361 STOP  
362 RTN

363♦LBL 04  
364 ASTO 04  
365 "FC?"  
366 XEQ 05  
367 CLA  
368 ARCL 04

369 "FOS?"  
370 XEQ 05  
371 RTN

372♦LBL 05  
373 PROMPT  
374 STO IND  
00

375 1  
376 ST+ 00  
377 RTN

378♦LBL 06  
379 \*  
380 \*  
381 \*  
382 RTN  
383 .END.

01♦LBL "LCC	COMPONENT/SYSTEM RELIABILITY
REL"	
02 "*LEV"	NUMBER OF LEVELS?
03 XEQ 88	
04 STO 08	
05♦LBL 06	
06 "*CIR/LE	NUMBER OF CIRCUITS/LEVEL?
V"	
07 XEQ 88	
08 STO 09	
09♦LBL 07	
10 XEQ 08	
11♦LBL 10	
12 DSE 09	CIRCUIT LOOP
13 GTO 07	
14 DSE 08	LEVEL LOOP
15 GTO 06	
16 "SYSTEM	SYSTEM OUTPUT
REL="	
17 ARCL X	
18 AVIEW	
19 FS? 55	
20 STOP	
21 "END"	
22 AVIEW	
23 STOP	
24♦LBL 08	COMPONENT LOOP
25 "Y"	
26 ASTO Y	
27 "COM MTB	COMPONENT MEAN TIME BETWEEN FAILURES
F="	EQUAL?
28 XEQ 88	
29 ASTO X	
30 X=Y?	
31 SF 01	
32 1	
33 STO 04	
34 STO 05	
35 STO 07	
36 "S"	
37 ASTO Y	
38 "S/P"	COMPONENTS IN SERIES OR PARALLEL?
39 XEQ 88	
40 ASTO X	
41 X=Y?	
42 GTO 01	
43♦LBL A	
44 SF 02	
45 "*COM/CI	NUMBER OF COMPONENTS IN THE CIRCUIT?
R"	

46 XEQ 88	
47 STO 01	
48 STO 06	
49 "PAR CI	NUMBER OF PARALLEL CIRCUITS?
R"	
50 XEQ 88	
51 STO 02	
52♦LBL 03	PARALLEL CIRCUIT LOOP
53 XEQ 02	
54 1	
55 X<>Y	
56 -	
57 ST* 05	
58 FS? 01	
59 XEQ 87	
60 DSE 01	
61 GTO 03	
62 RCL 05	
63♦LBL 04	
64 1	
65 X<>Y	
66 -	
67 ST* 07	
68 RCL 06	
69 STO 01	
70 DSE 02	
71 GTO 03	
72 RCL 07	
73 XEQ 89	
74♦LBL B	
75♦LBL 01	
76 "COM/SE	NUMBER OF COMPONENTS IN SERIES?
R"	
77 XEQ 88	
78 STO 03	
79♦LBL 02	SERIES CIRCUIT LOOP
80 "REL"	COMPONENT RELIABILITY IF KNOWN?
81 XEQ 88	
82 X>0?	
83 GTO 11	
84 "MTBF"	MTBF IF RELIABILITY UNKNOWN?
85 XEQ 88	
86 1/X	
87 "T"	TIME PERIOD?
88 XEQ 88	
89 *	
90 CHS	
91 E↑X	
92♦LBL 11	
93 FS? 02	

94 RTN  
95 ST\* 04  
96 FS? 01  
97 XEQ 86  
98 DSE 03  
99 GTO 02  
100 RCL 04

101♦LBL 05  
102 XEQ 89

#### OUTPUT RELIABILITY

103♦LBL C  
104 RCL 07  
105 RCL 04  
106 \*  
107 XEQ 89

108♦LBL 86  
109 RCL 03  
110 Y↑X  
111 GTO 05

#### WORKING LABELS

112♦LBL 87  
113 RCL 01  
114 Y↑X  
115 GTO 04

116♦LBL 88  
117 "F?"  
118 PROMPT  
119 RTN

120♦LBL 89  
121 CF 01  
122 CF 02  
123 "RELIABI  
LITY="

124 ARCL X  
125 RVIEW  
126 FS? 55  
127 STOP  
128 GTO 10  
129 END



APPENDIX C  
EXAMPLE PROGRAM RUNS

XEQ "RAND"  
EM/UN WGT?  
UN

RAND EXAMPLE

UNIT WGT?  
104.322.000  
0 RUN

CARGO?  
Y

MAX SPD KNOT  
S?  
491.0000

NUM FLT TEST  
?  
100.0000

HRS EN=12.56  
5.047.86

HRS TO=10.69  
8.291.75

HRS LA=32.73  
5.811.48

\$ MATL=445.1  
29.157.7

\$ DEV =104.7  
16.301.2

\$ PROG=2.191  
.198.907.

\$ FL T=42.04  
8.591.29

QC=2.784.726  
.363

RUN

XEQ "NOR"      NORTHROP EXAMPLE  
 DTJ?  
 N                      RUN  
 ABTF?  
 Y                      RUN  
 AW-A/A-A/G?  
 Y                      RUN  
 N F?  
 N                      RUN  
 S S?  
 Y                      RUN  
 AF LR  
   .8000              RU  
                     N  
 EW?  
   20,000.0000  
                     RUN  
 %G?  
   .3500              RU  
                     N  
 %T?  
   .0100              RU  
                     N  
 %D?  
   .3500              RU  
                     N  
 AF 750=3.819  
   .126.892  
                     RUN  
 EN LR  
   .9000              RU  
                     N  
 FMIL?  
   11,000.0000  
                     RUN  
 BPR?  
   1.0000              R  
                     UN  
 FMAX?  
   19,000.0000  
                     RUN  
 PU 1000=1.29  
   4,040.200  
                     RUN  
 N?  
   2.0000              R  
                     UN  
 P 750=2,869,  
   571.696  
                     RUN

AV LR  
   .9200       RU  
               N  
 AV WT?  
   1,500.0000  
               RUN  
 E 750=2,250,  
 000.000  
               RUN  
 F 750=8,938,  
 698.588  
               RUN  
 RD=2,417.88  
 6,289.  
               RUN  
 UF?  
   .8000       RU  
               N  
               RUN  
 NYRS?  
   15.0000  
               RUN  
 UR?  
   300.0000  
               RUN  
 \$/GAL?  
   .4400       RU  
               N  
 F\*S?  
   7,500.0000  
               RUN  
 L/D?  
   11.7650  
               RUN  
 POL\$/FH=422.  
 6274  
               RUN  
 Q?  
   729.0000  
               RUN  
 AQ=2,809,714  
 ,498.  
               RUN  
 PQ=2,100,967  
 ,693.  
               RUN  
 EQ=1,645,863  
 ,157.  
               RUN  
 FQ=6,556,545  
 ,348.  
               RUN

AD-A123 045

THE UTILITY OF HANDHELD PROGRAMMABLE CALCULATORS IN  
AIRCRAFT LIFE CYCLE C... (U) AIR FORCE INST OF TECH  
WRIGHT-PATTERSON AFB OH SCHOOL OF SYST... D P BROOKS  
SEP 82 AFIT-LSSR-41-82

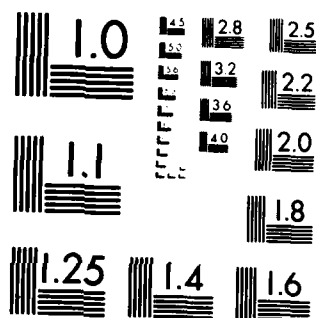
33

UNCLASSIFIED

F/G 1/0

NL

END  
DATE  
FILMED  
DTIC  
OTIC



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963 A

```

I OES=2,425,
921,779.      RUN
FH OES=3,998
,364,793.      RUN
CL IV M=354,
053,448.8      RUN
UE OES=1,392
,428,007.      RUN
POL OES=1,10
9,143,393.      RUN
OTH OES=1,50
9,953,473.      RUN
TLCC=1.9844E
10              RUN
END

```

XEQ "AM"

GRUMMAN EXAMPLE  
ADVANCED MATERIAL

C-141A ALL ARE 0

W  
TI%=?  
0.0000 R  
UN

S%=?  
0.0000 R  
UN

G%=?  
0.0000 R  
UN

GR%=?  
0.0000 R  
UN

B%=?  
0.0000 R  
UN

F  
TI%=?  
0.0000 R  
UN

S%=?  
0.0000 R  
UN

G%=?  
0.0000 R  
UN

GR%=?  
0.0000 R  
UN

B%=?  
0.0000 R  
UN

N  
TI%=?  
0.0000 R  
UN

S%=?  
0.0000 R  
UN

G%=?  
0.0000 R  
UN

GR%=?  
0.0000 R  
UN

B%=?  
0.0000 R  
UN

T  
TI%=?  
0.0000 R  
UN



S%=?  
 0.0000 R  
 UN  
 G%=?  
 0.0000 R  
 UN  
 GR%=?  
 0.0000 R  
 UN  
 B%=?  
 0.0000 R  
 UN  
 XEQ "DA"  
 AL?  
 145.0000  
 RUN  
 AT?  
 2.0000 R  
 UN  
 AVIW?  
 1.567.0000  
 RUN  
 AVW?  
 2.102.0000  
 RUN  
 ATB0?  
 3.000.0000  
 RUN  
 B/H?  
 160.0000  
 RUN  
 CW?  
 66.090.0000  
 RUN  
 CFA?  
 721.0000  
 RUN  
 CV?  
 6.500.0000  
 RUN  
 EPR?  
 16.0000  
 RUN  
 FFY?  
 63.0000  
 RUN  
 FD?  
 3.4800 R  
 UN  
 #W?  
 10.0000  
 RUN

S%=?  
 0.0000 R  
 UN  
 G%=?  
 0.0000 R  
 UN  
 GR%=?  
 0.0000 R  
 UN  
 B%=?  
 0.0000 R  
 UN

XEQ "DA"

PERMANENT DATA INPUT

AL?  
 145.0000  
 RUN  
 AT?  
 2.0000 R  
 UN  
 AVIW?  
 1.567.0000  
 RUN  
 AVW?  
 2.102.0000  
 RUN  
 ATBD?  
 3.000.0000  
 RUN  
 B/H?  
 160.0000  
 RUN  
 CW?  
 66.090.0000  
 RUN  
 CFA?  
 721.0000  
 RUN  
 CV?  
 6.500.0000  
 RUN  
 EPR?  
 16.0000  
 RUN  
 FFY?  
 63.0000  
 RUN  
 FD?  
 3.4800 R  
 UN  
 #W?  
 10.0000  
 RUN

FV?	16.000.0000	
		RUN
FLVA?	14.0000	
		RUN
H/M?	3.7100	R
		UN
IFLW?	150.020.000	
	0	RUN
LW?	235.810.000	
	0	RUN
L+S?	305.7000	
		RUN
MM?	.8600	RU
		N
MOT?	63.2500	
		RUN
*ACT?	29.0000	
		RUN
*APU?	1.0000	R
		UN
*C/A?	5.0000	R
		UN
*CLS?	48.0000	
		RUN
*EN?	4.0000	R
		UN
*EX?	13.0000	
		RUN
*G+S?	0.0000	R
		UN
*HS?	33.0000	
		RUN
*IT?	12.0000	
		RUN
*S?	8.0000	R
		UN

ULF?  
 3.7500 R  
 UN  
 \*P?  
 5.0000 R  
 UN  
 RMFG?  
 15.0000 RUN  
 SS?  
 10.0000 RUN  
 TFF?  
 168.0000 RUN  
 TGWC?  
 316,600.000  
 0 RUN  
 TGWM?  
 323,100.000  
 0 RUN  
 \*PSN?  
 162.0000 RUN  
 TAVSS?  
 25.0000 RUN  
 TT?  
 84,000.0000 RUN  
 TKA?  
 252.0000 RUN  
 TWA?  
 13,051.0000 RUN  
 UR?  
 1,120.0000 RUN  
 WN?  
 160.7000 RUN  
 \*A?  
 289.0000 RUN  
 FH/A?  
 93.3000 RUN  
 LC?  
 180.0000 RUN  
 INF  
 1.0000 R  
 UN

XEQ "UAFD" SUBPROGRAM DATA INPUT

WA?  
3.228.0000  
RUN

WT/C?  
.1200 RU  
N

KFD?  
1.0000 R  
UN

FWA?  
5.645.0000  
RUN

TA?  
899.0000  
RUN

\*T?  
3.0000 R  
UN

NWA?  
1.150.0000  
RUN

TPS?  
1.0000 R  
UN

SF?  
0.0000 R  
UN

MT?  
21.000.0000  
RUN

TPEN?  
1.0000 R  
UN

CSD?  
1.0000 R  
UN

ANFT?  
1.0000 R  
UN

XEQ "UAFP" EXECUTE FIRST SUBPROGRAM UPC  
FTR? TYPE AIRCRAFT

N  
RUN

ATK?  
N  
RUN

C/T?  
Y  
RUN

SUBIF? INFLATION FACTORS

1.0000 R  
UN

RMIF?  
1.0000 R  
UN

XEQ "AF" SUBPROGRAM DATA INPUT

PDR?  
4.0000 R  
UN

REGR?  
20.6400  
RUN

RFLT?  
19.6600  
RUN

REN?  
17.3400  
RUN

RMGT?  
18.3200  
RUN

RMFS?  
16.7600  
RUN

RFBS?  
13.5100  
RUN

RTDE?  
19.5300  
RUN

RTFB?  
15.7500  
RUN

RQCL?  
16.3800  
RUN

XEQ "AFP" EXECUTE SECOND SUBPROGRAM UPC

\$APU?  
15.000.0000  
RUN

LR AF?  
.7500 RU  
N

XEQ "UAV" EXECUTE THIRD SUBPROGRAM UPC

ENTWR?  
4.5200 R  
UN

TIT?  
2.210.0000  
RUN

MQT?  
 63.2500  
 . RUN  
 EPR?  
 16.0000  
 RUN  
 SLM?  
 .7700 RU  
 N  
 AVIF?  
 1.0000 - R  
 UN  
 AVL?  
 .9000 RU  
 N  
 ENLR  
 .9000 RU  
 N

XEQ "RDD" DATA INPUT RDT&E  
 DT?  
 3.0000 R  
 UN  
 EPR?  
 16.0000  
 RUN  
 EAF?  
 498.0000  
 RUN  
 SLM?  
 .7700 RU  
 N

XEQ "RDP" EXECUTE RDT&E SUBPROGRAM  
 AFIF?  
 1.0000 R  
 UN  
 RENGR?  
 20.6400  
 RUN  
 RTDE?  
 19.5300  
 RUN  
 RTFB?  
 15.7500  
 RUN  
 RED LR AF?  
 .7500 RU  
 N  
 INS?  
 N  
 RUN

SPFAC?  
 1.5000 R  
 UN  
 RED LR EN?  
 .9000 RU  
 N  
 ENIF?  
 1.0000 R  
 UN  
 XEQ "OUT"  
 AFM=516,005.  
 256.9  
 RUN  
 AV=59,326.64  
 9.82  
 RUN  
 EN=165,866.6  
 95.6  
 RUN  
 %GSA?  
 .1040 RU  
 N  
 53,664,546.  
 72 \*\*\*  
 %PR?  
 .0600 RU  
 N  
 34,180,188.  
 22 \*\*\*  
 RED=829,043.  
 337.2  
 RUN  
 LR SUB?  
 .8900 RU  
 N  
 SUB PRD=332,  
 851,611.0  
 RUN  
 LR AF?  
 .7500 RU  
 N  
 AF PRD=1,821  
 ,939,554.  
 RUN  
 LR AV?  
 .9000 RU  
 N  
 AV PRD=202,3  
 43,956.8  
 RUN  
 LR EN?  
 .9000 RU  
 N

EXECUTE RDT&E AND PRODUCTION OUTPUT  
 SUBPROGRAM



EN PRD=749.4  
61,160.3

RUN

GSA=234,620,  
166.9

RUN

PROF=149,434  
,998.7

RUN

TOT PRD=3.49  
0,651,448.

RUN

XEQ "ISD"  
#B?

12.0000

RUN

XEQ "ISP"  
A/S/B=?  
Y

RUN

#Ba?  
12.0000

RUN

S/B?  
1.0000

R

UN

A/S?  
16.0000

RUN

XEQ "Y"

DATA INPUT FIRST SUBPROGRAM IS

EXECUTE FIRST SUBPROGRAM IS

DATA INPUT SECOND SUBPROGRAM IS

XEQ "YP"

EXECUTE SECOND SUBPROGRAM IS

XEQ "AV"  
#DAYS?  
18.0000

RUN

ENTWR?  
4.5200

R

UN

TIT?  
2,210.0000

RUN

XEQ "AVP"  
IS  
STR=333,911,  
154.8

RUN

EXECUTE THIRD SUBPROGRAM IS

INITIAL SPARES OUTPUT

CR=9,854,782  
 .509                    RUN  
 LG=31,690,88  
 5.57                    RUN  
 FC=19,123,95  
 0.77                    RUN  
 EI=146,692,7  
 34.5                    RUN  
 ECS=19,909,6  
 51.94                    RUN  
 EL=34,804,07  
 8.83                    RUN  
 HYD=16,807,5  
 97.91                    RUN  
 FUEL=3,301,3  
 33.904                    RUN  
 CH=3,134,342  
 .099                    RUN  
 ARM=0.0000                    RUN  
 APU=411,700.  
 2000                    RUN  
 %GEA?  
 .1040                    RU  
                          N  
 GEA=77,083,8  
 70.34                    RUN  
 %PROF?  
 .0600                    RU  
                          N  
 PROF=49,096,  
 495.88                    RUN  
 SSE=0.0000                    RUN  
 IT=80,757,12  
 1.90                    RUN  
 EN=240,827,4  
 08.4                    RUN  
 AV=121,548,8  
 48.0                    RUN

TOT IS=1,188		
.955,958.		
	RUN	
XEQ "OSB"		DATA INPUT FIRST SUBPROGRAM CARGO
MLD?		OPERATIONS AND SUPPORT
1,620.0000		
	RUN	
CSW?		
4,651.0000		
	RUN	
*PCP?		
2.0000	R	
	UN	
MVSQ?		
259.98+07		
	RUN	
*LGB?		
8.0000	R	
	UN	
MAL		
48,850.0000		
	RUN	
XEQ "OSP"		EXECUTE FIRST SUBPROGRAM C O&S
%SUP?		
.8740	RU	
	N	
*L/M?		
38.0000		
	RUN	
XEQ "APU"		DATA INPUT SECOND SUBPROGRAM C O&S
APUW		
547.0000		
	RUN	
ECSW		
2,648.0000		
	RUN	
CT		
2.0000	R	
	UN	
PCP		
2.0000	R	
	UN	
*G?		
5.0000	R	
	UN	
XEQ "APUP"		EXECUTE SECOND SUBPROGRAM C O&S
XEQ "HYD"		DATA INPUT THIRD SUBPROGRAM C O&S
*HP?		
6.0000	R	
	UN	

```

*HSFS
  3.0000      F
              UN
*ATM?
  0.0000      F
              UN
*PTU?
  0.0000      F
              UN
FUSW?
  1,402.0000
              RUN
*FUBP?
  20.0000
              RUN
*ANT?
  22.0000
              RUN
      XEQ "HYDP"
NOAC?
  227.0000
              RUN

```

EXECUTE THIRD SUBPROGRAM C O&S

```

      XEQ "EN"
ENTWR?
  4.5200      F
              UN

```

DATA INPUT ENGINE

```

      XEQ "ENG"
INF?
  1.0000      F
              UN

```

EXECUTE ENGINE AND CARGO OPERATIONS  
AND SUPPORT OUTPUT

```

G/H?
  1,940.0000
              RUN
C/G?
  .4200      RU
              N
POL=3,261,52
  2,099.
              RUN
BLM=1,449,24
  2,263.
              RUN
RS=591,439,3
  76.5
              RUN
DCR=1,253,18
  3,061.
              RUN
BLO=1,373,65
  2,932.
              RUN
BLT=979,177,
  552.5
              RUN
PDM=228,381,
  170.6
              RUN

```

OM=27,024,25  
3.24

          RUN  
TOT OES=5.90  
2,100,610.  
          RUN

XEQ "LN CURV

LEARNING CURVE EXAMPLE

UNIT/CUM?

UNIT CURVE

U

RUN

\* UNITS?

15.0000

RUN

UNIT OF INT?

10.0000

RUN

UNIT 1 COST?

75,000.0000

RUN

% LEARN?

.9500

RU

N

UN COST=63.2

50.0222

RUN

TOT COST=981

,903.7907

XEQ "LN CURV

CUMULATIVE AVERAGE CURVE

UNIT/CUM?

C

RUN

\* UNITS?

15.0000

RUN

UNIT OF INT?

10.0000

RUN

UNIT 1 COST?

75,000.0000

RUN

% LEARN?

.9500

RU

N

UN COST=58.7

94.3795

RUN

TOT COST=920

,706.2378

XEQ "LSC"  
DEVC?

50,000.0000  
RUN

SYSI?

900,000.000  
0 RUN

SEC?

150,000.000  
0 RUN

M?

20.0000  
RUN

ROH?

600,000.000  
0 RUN

POH?

115,000.000  
0 RUN

PIUP?

15.0000  
RUN

UC?

1,100.0000  
RUN

W?

40.0000  
RUN

MTBD?

170.0000  
RUN

MTBR?

102.0000  
RUN

NRTS?

.0500 RU  
N

RTS?

.9500 RU  
N

COND?

.0100 RU  
N

PAMH?

.5000 RU  
N

RMH?

.5000 RU  
N

SMI?

0.0000 R  
UN

SMH?

0.0000 R  
UN

LRU/SRU LOGISTICS SUPPORT COST EXAMPLE  
INPUT DATA

BCMH?		
.2000	RU	
	N	
BMH?		
.3600	RU	
	N	
BMC?		
105.0000		
	RUN	
BRCT?		
.1300	RU	
	N	
DMH?		
5.0000	R	
	UN	
DMC?		
150.0000		
	RUN	
PA?		
3.0000	R	
	UN	
PP?		
15.0000		
	RUN	
PCB?		
15.0000		
	RUN	
OST?		
.5300	RU	
	N	
DRCT?		
1.9400	R	
	UN	
BLR?		
21.3800		
	RUN	
DLR?		
30.1700		
	RUN	
PSC?		
1.4300	R	
	UN	
SA?		
8.7500	R	
	UN	
IMC?		
1,200.0000		
	RUN	
RMC?		
150.0000		
	RUN	
BSC = \$198,0		
00.0000		
	RUN	

OUTPUT



BSTK = \$9.00  
00

RUN  
DSC = \$72.60  
0.0000

RUN  
DSTK = \$66.0  
000

RUN  
SIC = \$420.6  
00.0000

RUN  
TPC = \$1,320  
.600.000

RUN  
BMHC = \$2.90  
8,937.647

RUN  
BMMH = \$453.  
5294

RUN  
PMSH = \$30.5  
539

RUN  
BMMC = \$8.80  
1,470.588

RUN  
DMHC = \$665.  
514.7057

RUN  
DMMH = \$1.47  
0.5882

RUN  
DMMC = \$661.  
764.7059

RUN  
SDTC = \$681.  
352.9412

RUN  
CSC = \$971.3  
00.0000

RUN  
QSC = \$883.0  
000

RUN  
IMCC = \$115.  
425.0000

RUN  
TOC = \$14.80  
5,765.59

RUN  
RUN  
LCC = \$16.17  
6,365.59

RUN

XEQ "ORLA"

OPTIMUM REPAIR LEVEL EXAMPLE

BRCYT?  
.3300      RU  
            N

LWRD?  
18.0500      RUN

LWRI?  
13.0300      RUN

DSST?  
.5000      RU  
            N

NTDPRD?  
10.0000      RUN

NTDPRI?  
10.0000      RUN

MCFA?  
46.6000      RUN

MCFF?  
46.6000      RUN

NRA?  
0.0000      R  
            UN

NNRA?  
30.0000      RUN

MTBCT?  
63,155.0000      RUN

MTBF?  
164,203.0000  
0      RUN

NB?  
1.0000      R  
            UN

NBC?  
1.0000      R  
            UN

NBOS?  
0.0000      R  
            UN

OSTC?  
1.0000      R  
            UN

OSTOS?  
1.0000      R  
            UN

IL?  
10.0000      RUN

FRCPP?		
.0100	RU	
	N	
PSLRC?		
.2861	RU	
	N	
PSLROS?		
1.0000	R	
	UN	
PSMRC?		
.0630	RU	
	N	
PSMROS?		
1.0000	R	
	UN	
PWRC?		
1.2850	R	
	UN	
PWROS?		
1.0000	R	
	UN	
QPA?		
10.0000		
	RUN	
MCA?		
104.2000		
	RUN	
MHCT?		
1.5000	R	
	UN	
MCP?		
104.2000		
	RUN	
DRPT?		
1.4800	R	
	UN	
FSAC?		
36.5900		
	RUN	
CRM?		
4.0000	R	
	UN	
SSRC?		
.0513	RU	
	N	
SSROS?		
1.0000	R	
	UN	
RMW?		
.0100	RU	
	N	
TDOCP?		
160.0000		
	RUN	

UC?  
 363.0000  
 RUN  
 U/B?  
 12.0000  
 RUN  
 OH/M?  
 348.0000  
 RUN  
 UW?  
 .5000 - RU  
 N  
 PTRD?  
 .1500 RU  
 N  
 PTRI?  
 .3300 RU  
 N  
 PTTD?  
 1.0000 R  
 UN  
 PTTI?  
 1.0000 R  
 UN  
 DTD?  
 .0500 RU  
 N  
 DTI?  
 .0500 RU  
 N  
 TCPD?  
 200.0000  
 RUN  
 TCPI?  
 200.0000  
 RUN  
 DISCARD=29,5  
 71.6076  
 RUN  
 INTERMEDIATE  
 =43,519.9089  
 RUN  
 DEPOT=33,981  
 .1351  
 RUN  
 DEPOT=33,981  
 .1351?

XEQ "LCC REL      RELIABILITY EXAMPLE

\*LEV?  
5.000000      RUN  
\*CIR/LEV?  
1.000000      RUN  
COM MTBF=?  
Y      RUN  
S/P?  
P      RUN  
\*COM/CIR?  
2.000000      RUN  
\*PAR CIR?  
1.000000      RUN  
REL?  
0.000000      RUN  
MTBF?      RUN  
500.000000  
T?  
1.000000      RUN  
RELIABILITY=  
0.999996      RUN  
\*CIR/LEV?  
3.000000      RUN  
COM MTBF=?  
N      RUN  
S/P?  
S      RUN  
\*COM/SER?  
2.000000      RUN  
REL?  
.999996      RUN  
REL?  
0.000000      RUN  
MTBF?  
500.000000      RUN

```

T?
  1.000000
                                RUN
RELIABILITY=
0.997998
                                RUN
                                RUN
COM MTBF=?
Y
                                RUN
S/P?
S
                                RUN
#COM/SER?
  3.000000
                                RUN
REL?
  0.000000
                                RUN
MTBF?
  500.000000
                                RUN
T?
  1.000000
                                RUN
RELIABILITY=
0.994018
                                RUN
                                RUN
COM MTBF=?
Y
                                RUN
S/P?
S
                                RUN
#COM/SER?
  1.000000
                                RUN
REL?
  0.000000
                                RUN
MTBF?
  500.000000
                                RUN
T?
  1.000000
                                RUN
RELIABILITY=
0.998002
                                RUN
#CIR/LEV?
  1.000000
                                RUN

```

```

COM MTBF=?
N
RUN
S/P?
P
RUN
*COM/CIR?
3.000000
RUN
*PAR CIR?
1.000000
RUN
REL?
.998002
RUN
REL?
.997998
RUN
REL?
.994018
RUN
RELIABILITY=
1.000000
RUN
RUN
*CIR/LEV?
2.000000
RUN
COM MTBF=?
N
RUN
S/P?
S
RUN
*COM/SER?
2.000000
RUN
REL?
1.000000
RUN
REL?
0.000000
RUN
MTBF?
500.000000
RUN
T?
1.000000
RUN
RELIABILITY=
0.998002
RUN
COM MTBF=?
Y
RUN

```

```

S/P?
S
                                RUN
#COM/SER?
2.000000
                                RUN
REL?
0.000000
                                RUN
MTBF?
500.000000
                                RUN
T?
1.000000
                                RUN
RELIABILITY=
0.996008
                                RUN
#CIR/LEV?
1.000000
                                RUN
COM MTBF=?
N
                                RUN
S/P?
P
                                RUN
#COM/CIR?
2.000000
                                RUN
#PAR CIR?
1.000000
                                RUN
REL?
.998002
                                RUN
REL?
.996008
                                RUN
RELIABILITY=
0.999992
                                RUN
SYSTEM REL=0
.999992

```



APPENDIX D  
OUTPUT COMPARISON

RAND	C-141A	Airframe R&D and Production	
	<u>Model</u>	<u>Original</u>	<u>Actual</u>
Hrs En	12,565,047.86	17,166,982	13,000,000
Hrs Tool	10,698,291.74	14,266,000	10,700,000
Hrs Lab	32,735,811.48	43,508,000	30,000,000
\$ Matl	445,129,157.70	595,939,000	387,345,000
\$ Dev	104,716,301.20	136,771,000	47,485,000
\$ Prog	2,191,198,907.00	2,921,599,000	1,849,211,000
\$ Fl Tst	42,048,591.29	49,506,000	40,391,000
QC	2,784,726.36	3,698,000	1,610,000

NORTHROP	A-10	Aircraft R&D, Production, and Operations and Support	
	<u>Model</u>	<u>Original</u>	
AF750	3,819,126.89	3,819,000.00	
Pu1000	1,294,040.20	1,294,000.00	
P750	2,869,571.70	2,870,000.00	
E750	2,250,000.00	2,250,000.00	
F750	8,938,698.59	8,939,000.00	
R&D	2,417,886,289.00	2,379,000,000.00	Math Error
POLFH	422.63	423.00	
A729	2,809,714,498.00	2,810,000,000.00	
P729	2,100,967,693.00	2,101,000,000.00	
E729	1,645,863,157.00	1,646,000,000.00	
F729	6,556,545,348.00	6,557,000,000.00	
I O&S	2,425,921,779.00	2,426,000,000.00	
FH O&S	3,998,364,793.00	3,998,000,000.00	
CL IV M	354,053,448.80	354,000,000.00	
UE O&S	1,392,428,007.00	1,118,000,000.00	Math Error
POL O&S	1,109,143,393.00	1,109,000,000.00	
OTH O&S	1,589,953,473.00	1,590,000,000.00	
TOT LCC	19,844,000,000.00	19 5,310,000,000.00	Notation Error

GRUMMAN      C-141A      Aircraft R&D, Production, Initial Spares,  
and Operations and Support

	<u>Model</u>	<u>Original</u>
AFM	516,005,256.90	561,755,000.00
AV	59,326,649.82	61,939,000.00
EN	165,866,695.60	163,511,000.00
G&A	53,664,546.72	58,423,000.00
PR	34,180,188.22	37,211,000.00
TOT	829,043,337.20	882,838,100.00
AFM	1,821,939,554.00	1,860,443,000.00
AV	202,343,956.80	226,629,000.00
EN	749,461,160.30	716,906,000.00
G&A	234,620,166.90	205,271,000.00
PR	149,434,998.70	130,742,000.00
TOT	3,490,651,448.00	3,139,990,200.00
STR	333,911,154.80	351,224,100.00
CR	9,854,782.51	13,141,200.00
LG	31,690,885.57	35,718,300.00
FC	19,123,950.77	21,043,600.00
EI	146,692,734.50	109,067,700.00
ECS	19,909,651.94	22,760,600.00
EL	34,804,078.83	41,549,500.00
HYD	16,807,597.91	21,783,500.00
FUEL	3,301,333.90	6,454,700.00
CH	3,134,342.10	2,772,500.00
APU	411,700.20	2,416,500.00
G&A	77,083,870.34	79,956,000.00
PR	49,096,495.88	50,926,000.00
IT	80,757,121.90	80,374,000.00
EN	240,827,408.40	199,887,100.00
AV	121,548,848.00	140,874,400.00
TOT	1,188,955,958.00	1,099,575,600.00
POL	3,261,522,099.00	3,261,522,000.00
BLM	1,449,242,263.00	1,485,428,000.00
RS	591,439,376.50	605,432,000.00
DCR	1,253,183,061.00	1,277,842,000.00
BLO	1,373,652,932.00	1,373,653,000.00
BLT	979,177,552.50	979,178,000.00
PDM	228,381,170.60	228,381,000.00
OM	27,024,253.24	26,306,000.00
TOT	5,902,100,610.00	5,976,218,500.00

LSC

	<u>Model</u>	<u>Original</u>
BSC	198,000.00	198,000.00
BSTK	9.00	9.00
DSC	72,600.00	72,600.00
DSTK	66.00	66.00
SIC	420,600.00	420,600.00
TPC	1,320,600.00	1,320,600.00
BMHC	2,908,937.65	2,908,937.65
BMMH	453.53	453.53
PMSH	30.55	30.55
BMMC	8,801,470.59	8,801,470.59
DMHC	665,514.71	665,514.71
DMMH	1,470.59	1,470.59
DMMC	661,764.71	661,764.71
SDTC	681,352.94	681,352.94
CSC	971,300.00	971,300.00
QSC	833.00	383.00
IMCC	115,425.00	115,425.00
TOC	14,805,765.59	14,805,765.59
LCC	16,178,365.59	16,176,365.59

ORLA

	<u>Model</u>	<u>Original</u>
DISCARD	29,571.61	29,571.01
INTERMEDIATE	43,519.91	43,415.44
DEPOT	33,981.14	33,969.68

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